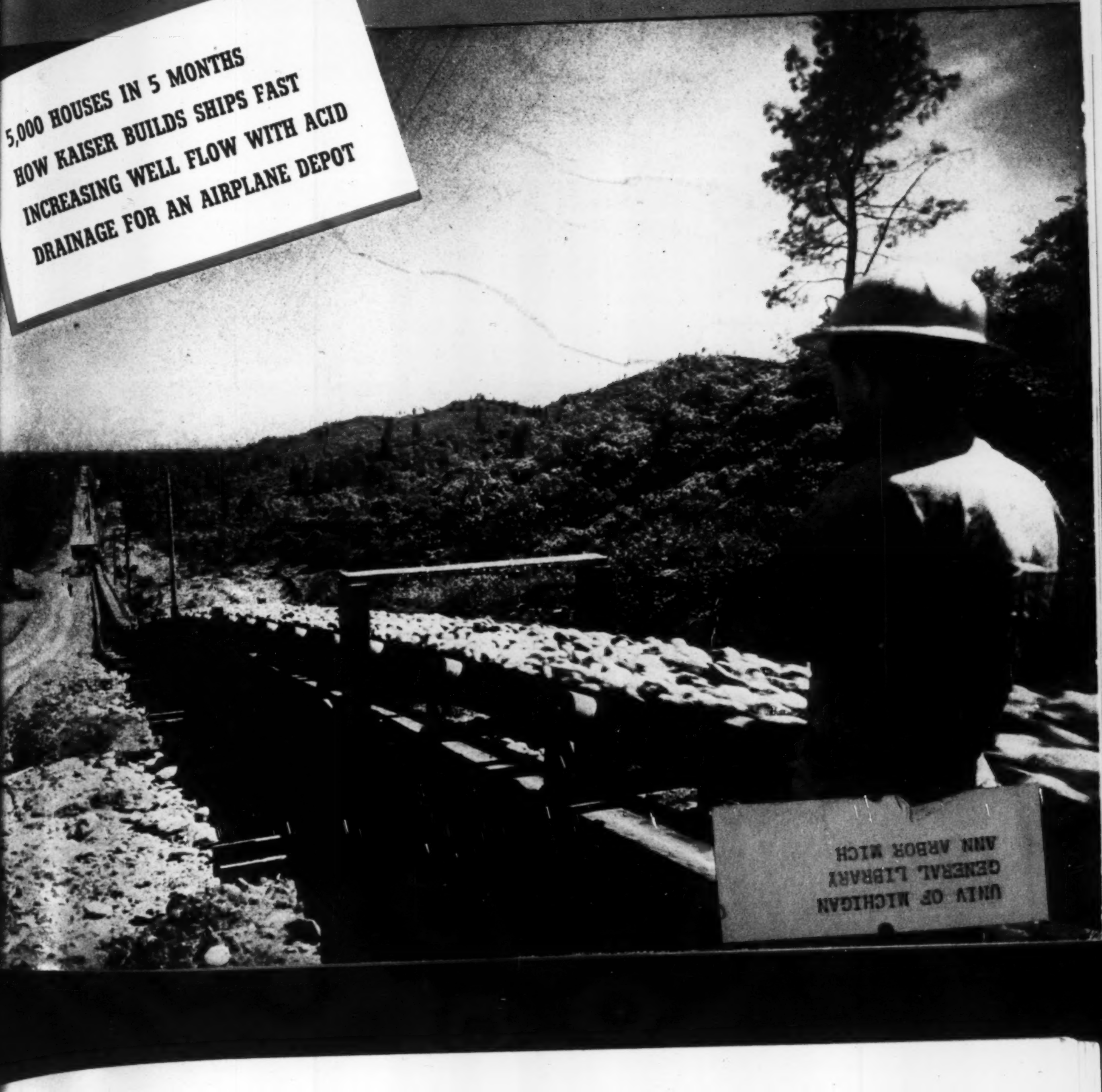
AUG 17 1942

ENGINEERING NEWS-RECORD

AUGUST 13, 1942

Over hill and valley, this 9-mile belt conveyer at Shasta Dam moves a 1,000 tons of aggregate every hour.

5,000 HOUSES IN 5 MONTHS
HOW KAISER BUILDS SHIPS FAST
INCREASING WELL FLOW WITH ACID
DRAINAGE FOR AN AIRPLANE DEPOT



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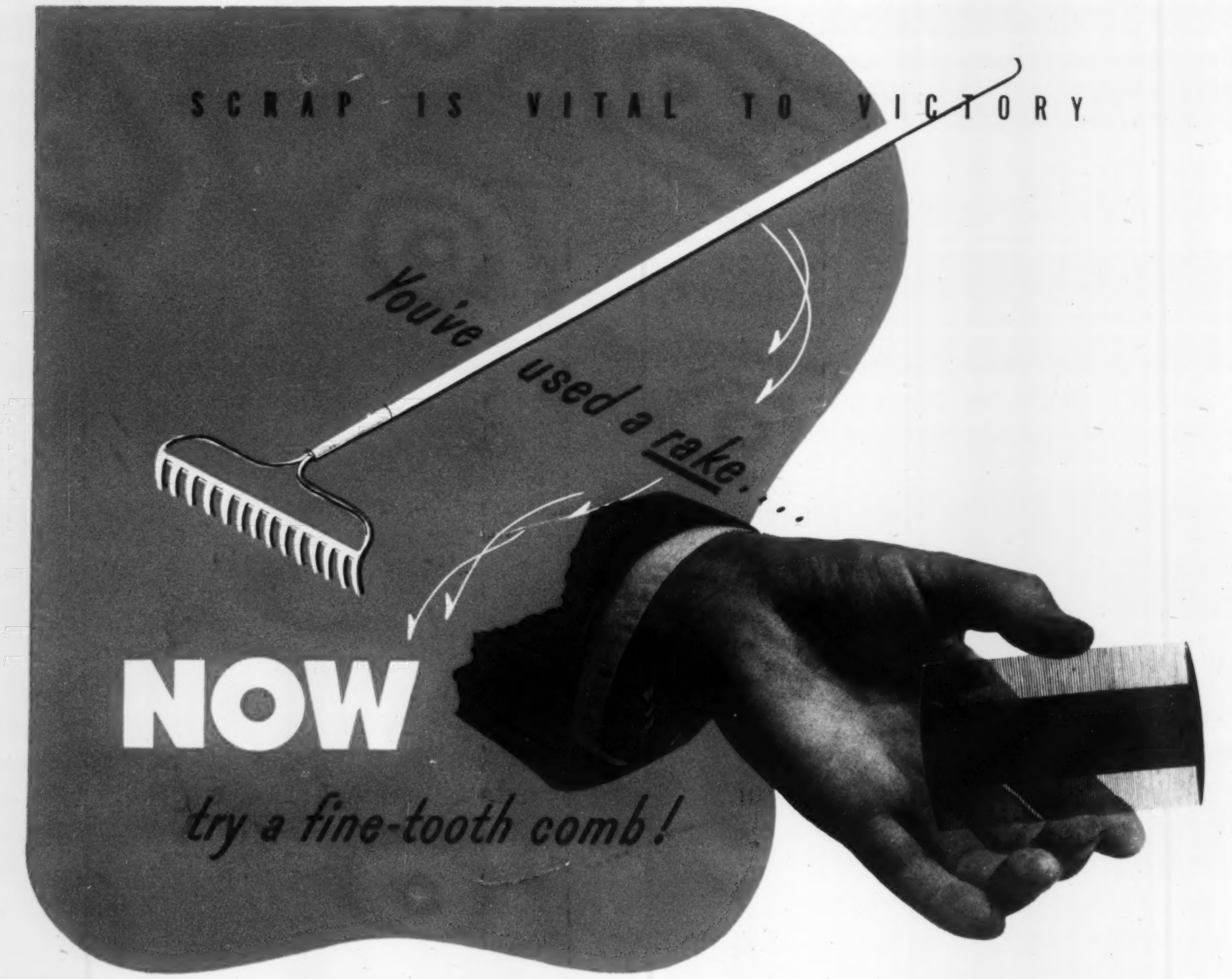
SCRAP IS VITAL TO VICTORY
You've used a rake....
NOW
try a fine-tooth comb!

No need to waste words telling you the *importance* of scrap; you know that. But have you really combed the premises for it—the way you'd ransack the house for a missing collar button, fifteen minutes before a banquet?

The scrap-yard isn't the place to start the hunt. It's in the cellar, on the roof, in dark corners and dead-storage space, that you'll strike pay-ore.

It may be old equipment—"too good to throw away" at the time it was replaced . . . it may be material the scrap dealer once turned down, because of cost of cutting up and transporting, during a weak scrap-market period . . . it may be an obsolete structure, machine or piece of equipment left in place when its usefulness ended, and now so much a part of the scenery that you aren't conscious of its existence.

For instance—one engineer recently looked out of his hotel window and saw on a set-back roof an I-beam, useless for years, but a "national resource" today. Another noticed an old weed-covered lock-gate along a canal. Not worth salvaging when discarded, but a bonanza in 1942. These two finds alone represented tons of valuable material.

Right now the scrap lying idle throughout the country is more important to the nation than all its gold . . . because without scrap the fine steels so vital to victory cannot be produced in needed tonnages. Rounding it up is a job that depends on individual efforts. Will you help?

LOOK HERE for SCRAP

Discarded equipment in dead storage . . . Abandoned or wrecked bridges . . . Pipe lines no longer active . . . Abandoned sand and gravel plant equipment . . . Chain and wire rope . . . Sunken equipment in shallow water . . . Replaced culverts . . . Pipe and fittings . . . Unused storage tanks . . . Unserviceable or broken parts.

A. M. BYERS COMPANY
PITTSBURGH, PENNSYLVANIA
Established 1864
Producers of Standard Alloys—High Heat Resisting Steels—Wrought Iron

ENGINEERING NEWS-RECORD

Devoted to Buildings, Sewers, Waterworks, Bridges, Highways, Streets, Dams, Foundations, Earthwork, Flood Control, Public Works, Irrigation, Canals, Railroads

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Vol. 129 AUGUST 13, 1942 No. 7

COMING NEXT

- Using sand instead of concrete for the inner base of a main pier for a new bridge over the Mississippi River saved 1,384 cu. yd. of concrete and reduced the dead weight of the pier by 1,120 tons. Design of the crib work and construction procedure are featured.

- More than a hundred miles of roads were recently laid in advance of building operations at a mid-west ordnance plant. An article on this project points out the advantages of an adequate system of roads for the movement of men and materials as an aid to rapid construction. Here too, the full use of all available local materials speeded up the work.

- By substituting more planning in the office for less work and confusion in the field, the contractors for a 3,500 unit housing project made it possible for 100 carpenters to prepare column and deck forms for an average of 25,000 sq. ft. of concrete slab daily See Aug. 27 issue.

- A new type of sampling spoon for soft and cohesionless soils had been developed that has many advantages over old type samplers. Positive mechanical action is assured as the devise does not depend upon friction nor vacuum for raising the sample to the surface. This instrument will prove a valuable asset in the field.

LOOKING AHEAD

- As the tempo of our war effort is stepped up to an ever higher and higher pitch, so comes increasing demands upon the construction industry for speed and more speed. Traditions are being cast to the four winds. An example in point is the design, based on soil and concrete studies, being used at an Ohio ordnance plant that permits unreinforced concrete floor slabs to be cast integral with wall sills and column pedestals—but without footings—to form the foundations of buildings up to 50x500 ft.

- An improved method of getting accurately proportioned cement into the soil for cement stabilized base courses will be described in a forthcoming issue. This method saves 0.5 lb. of cement per sack, saves critical war material, and eliminates the possibility of rain damage to cement when spread in advance of mixing.

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Number of copies of this issue printed: 36,961

QUICK STEEL
IN
RYERSON STOCK

Your nearby Ryerson plant carries reinforcing bars, wire mesh, structurals, roofing... and practically every form of construction steel and allied products . . . in stock for immediate shipment.

The demands of wartime, naturally, have limited our stock, but we are in a position to furnish steel for the war program and essential industries.

HELP FOR BUILDERS

The Ryerson Contractors & Builders Division offers a comprehensive service for planning and completing your jobs on time. Shipments of fabricated structural steel; or cut, bent and tagged reinforcing bars are scheduled to meet your actual day-to-day needs as the job progresses. Let Ryerson engineers help you with plans or problems.

New 1942 Stock List mailed on request

●

Joseph T. Ryerson & Son, Inc. Plants in: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

Complete Facilities for cutting, bending or forming Reinforcing steels to specification.

RYERSON
STEEL-SERVICE

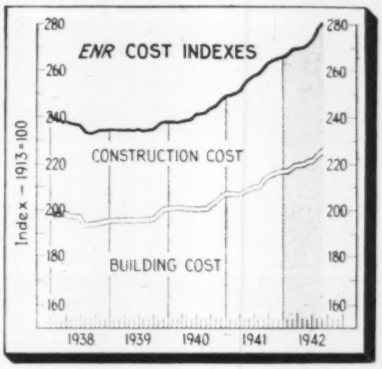
Prompt Deliveries to meet your day-to-day job needs and keep materials coming on schedule.

RYERSON

MONTHLY CONSTRUCTION BUSINESS SUMMARY

ENR CONSTRUCTION VOLUME AND NEW CAPITAL . . . FHA MORTGAGES

(,000 omitted)	July 1941 (5 wk.)	July 1942 (5 wk.)	% Change	Seven Months 1941 (31 wk.)	Seven Months 1942 (31 wk.)	% Change
Total Construction	$958,663	$1,201,526	+25.0	$3,809,066	$6,106,820	+61.0
Private Construction	86,342	62,040	−28.0	829,760	493,448	−51.0
Public Construction	872,321	1,139,486	+31.0	2,979,306	5,703,372	+92.0
Federal	743,541	1,088,587	+46.0	2,171,494	5,323,507	+145.0
Total New Productive Capital	$1,656,731	$2,613,956	+58.0	$5,007,275	$9,509,250	+90.0
Private Investment	193,171	22,313	−88.0	585,605	330,698	−44.0
Federal (non-federal work)	287,508	163,700	−43.0	354,281	211,119	−40.0
Federal (federal work)	1,176,052	2,427,943	+106.0	4,067,389	8,966,898	+120.0
FHA Mortgages Selected for Appraisal (Title II)	$133,843	$24,915	−82.0	$891,657	$403,232	−55.0
(Title VI)	$19,239	$58,767	+205.0	$93,761	$461,825	+393.0



CONSTRUCTION COSTS . . . WAGE RATES . . . PRICES

	August 1941	August 1942	% Change	Changes July to August: 1941 July	1941 Aug.	%	1942 July	1942 Aug.	%
E N R Construction Cost Index, 1913 = 100‡	260.41	281.61	+8.1	258.18	260.41	+0.9	277.65	281.61	+1.4
E N R Building Cost Index, 1913 = 100‡	212.45	225.39	+6.1	210.22	212.45	+1.1	223.45	225.39	+0.9

‡ *Does not reflect increased costs due to more overtime, lower labor efficiency, delivery delays, etc.*

ENR 20-CITIES' AVERAGE

	August 1941	August 1942	% Change	1941 July	1941 Aug.	%	1942 July	1942 Aug.	%
Common Labor	$0.753	$0.823	+9.3	$0.753	$0.753	0	$0.803	$0.823	+2.5
Skilled Labor (Av. 3 trades)	1.501	1.585	+5.6	1.501	1.501	0	1.556	1.585	+1.9
Bricklayers	1.595	1.687	+5.8	1.595	1.595	0	1.665	1.687	+1.3
Structutal Ironworkers	1.582	1.632	+3.2	1.582	1.582	0	1.612	1.632	+1.2
Carpenters	1.327	1.435	+8.1	1.327	1.327	0	1.392	1.435	+3.1
Cement, per bbl	$2.52	$2.60	+3.2	$2.52	$2.52	0	$2.61	$2.60	−0.4
Reinforcing steel, per cwt	2.59	2.69	+3.9	2.60	2.59	−0.4	2.70	2.69	−0.4
Struct. steel shapes, base	2.10	2.10	0	2.10	2.10	0	2.10	2.10	0
Sand, per ton	1.18	1.21	+2.5	1.18	1.18	0	1.20	1.21	+0.8
Lumber, 2x4 Fir, per M ft.	43.05	51.10	+18.7	41.22	43.05	+4.4	51.18	51.10	−0.2
Lumber, 2x4 Pine, per M ft.	39.63	44.27	+11.7	37.37	39.63	+6.1	44.27	44.27	0
Brick, common, per M	14.76	15.56	+5.4	14.81	14.76	−0.3	15.46	15.56	+0.6
Ready-mixed concrete, c.y.	7.07	7.34	+3.8	7.02	7.07	+0.7	7.34	7.34	0
Struct. clay tile, 3x12x12	75.01	77.97	+3.9	74.21	75.01	+1.1	77.32	77.97	+0.8
Paving asphalt, cars, ton	14.60	14.92	+2.2	14.49	14.60	+0.8	14.92	14.92	0

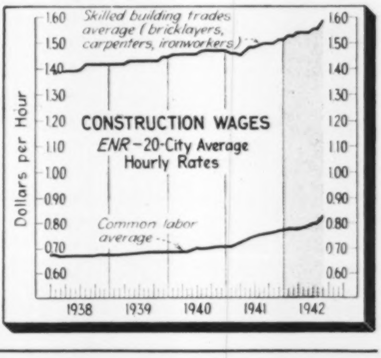
ENR INDEX NUMBERS

Base = 100	Construction Cost 1913	Construction Cost 1926	Building Cost 1913	Building Cost 1926	Volume '13	Volume '26
Aug., 1942	281.61	135.37	225.39	121.84	...	...
July, 1942	277.65	133.46	223.45	120.79	736	323
June, 1942	274.19	131.80	221.18	119.56	752	330
May, 1942	272.30	130.89	220.14	119.00	821	360
April, 1942	271.78	130.64	219.55	118.68	569	249
Mar., 1942	269.71	129.65	218.88	118.32	578	253
Feb., 1942	269.41	129.51	218.44	118.08	507	222
Jan., 1942	267.63	128.65	217.12	117.37	402	176
Dec., 1941	266.16	127.94	216.37	116.96	217	95
Nov., 1941	266.13	127.93	216.54	117.05	282	124
Oct., 1941	264.46	127.13	215.92	116.72	263	115
Sept., 1941	263.12	126.48	214.58	116.00	419	184
Aug., 1941	260.41	125.18	212.45	114.84	434	190
July, 1941	258.18	124.11	210.22	113.64	635	278
1941 (Av.)	257.84	123.95	211.46	114.32	375	164
1940 (Av.)	241.96	116.31	202.81	109.64	269	118
1939 (Av.)	235.51	113.21	197.44	106.73	211	92
1938 (Av.)	235.86	113.34	196.83	106.40	197	86

MATERIAL SHIPMENTS . . . BUILDING PERMITS

	July 1941	July 1942	% Change	June 1942	% Change June-July
Lumber (% 1935–'39 weekly seas. av.) N.L.M.A.	150.0	155.4	+3.6	155.0	+0.3
Steel (% operating capacity) A.I.S.I.	95.1	97.8	+2.8	98.7	−0.9

	June 1941	June 1942	% Change	Six Months 1941	Six Months 1942	% Change
Fabricated Structural Steel, tons, A.I.S.C.	200,509	178,790	−10.8	1,078,270	1,067,624	−1.0
Cement, thous. bbl. U.S.B. of M.	16,109	18,250	+13.3	71,644	79,344	+10.7
Building Permits, Dun & Bradstreet (,000 omitted)	$135,819	$59,171	−56.4	$757,581	$509,667	−32.7



COST OF LIVING INDEXES . . . EMPLOYMENT

	June 1941	June 1942	% Change	May 1942	% Change May-June
Cost of Living Index, N.I.C.B.	88.5	97.3	+9.9	97.3	0
Rent (Housing) Index, N.I.C.B.	88.2	91.0	+3.2	91.1	−0.1
Total Employment (est.) thous., B.L.S.	39,475	41,415	+4.7	41,263	+0.3
Construction Employment, (est.) thous., B.L.S.	1,816	2,073	+19.0	2,077	−0.2

ENGINEERING CONSTRUCTION CONTRACTS——ENGINEERING NEWS-RECORD——JULY, 1942

Engineering News-Record *reports projects of the following minimum costs—waterworks, excavation, drainage and irrigation, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000*

Five Weeks—Thousands of Dollars (000 Omitted)

	New England	Middle Atlantic	South	Mid West	West of Mississippi	Far West	United States July 1942	United States Seven Months 1942	United States Seven Months 1941	Canada
Public Works										
Waterworks	417	1,070	3,373	947	10,303	1,232	**17,342**	**74,681**	49,888	747
Sewerage	81	795	1,316	3,052	4,558	1,651	**11,453**	**64,727**	60,383	445
Bridges, public	15	579	856	720	2,076	817	**5,063**	**37,844**	71,210	213
Earthwork and waterways	490	750	1,045	67	3,741	3,350	**9,443**	**208,803**	177,601	70
Streets and roads	1,366	5,224	16,129	14,347	20,685	10,283	**68,034**	**296,610**	376,545	1,124
Buildings, public	8,969	74,159	99,588	132,494	302,225	85,647	**703,082**	**3,900,455**	1,693,564	9,527
Unclassified, public	8,723	12,880	67,741	10,691	150,283	74,751	**325,069**	**1,120,252**	550,115	6,594
Total public	**20,061**	**95,457**	**190,048**	**162,318**	**493,871**	**177,731**	**1,139,486**	**5,703,372**	**2,979,306**	**18,720**
Federal government (included in above classifications)	18,244	88,866	182,336	148,368	482,804	167,969	**1,088,587**	**5,323,507**	2,174,494	....
Private										
Bridges, private	....	25	....	....	64	....	**89**	**858**	5,360	....
Industrial buildings	1,576	4,686	6,229	4,421	4,105	1,944	**22,961**	**165,542**	335,075	7,907
Commercial buildings	5,952	8,096	513	2,860	1,055	15,672	**34,148**	**202,465**	339,991	250
Unclassified	116	3,765	37	133	751	40	**4,842**	**34,583**	140,334	530
Total private	**7,644**	**16,572**	**6,779**	**7,414**	**5,975**	**17,656**	**62,040**	**403,448**	**820,760**	**8,687**
Total Engineering Construction:										
July, 1942 — 5 weeks	**27,705**	**112,029**	**196,827**	**169,732**	**499,846**	**195,387**	**1,201,526**	....	....	**27,407**
June, 1942 — 4 weeks	48,958	79,189	139,711	212,051	294,376	194,653	**968,938**	....	....	25,922
July, 1941 — 5 weeks	21,838	162,387	262,030	75,217	283,111	151,080	**958,663**	....	....	52,175
Seven Months — 1942	**233,653**	**800,025**	**1,228,069**	**1,127,119**	**1,640,892**	**1,077,062**	....	**6,106,820**	....	**122,284**
Seven Months — 1941	186,223	809,457	873,853	611,990	802,816	515,727	....	....	3,800,066	165,268

SPEAK FOR YOURSELVES, Gentlemen!
I saved a whole week by using Atlas High-Early for floors at the Henderson Produce Company
The contract didn't call for it—but we used Atlas High-Early on a housing project for stair treads to save form lumber
We placed an Atlas High-Early floor at CENSORED about 4:30 P. M. Next morning they had up to 1,600 lbs. of steel per sq. ft. on it. Quick work!

All Atlas High-Early jobs are kin under the surface—they're fast and they save you money

These three short stories speak for themselves:

1. Machinery on floor before building completed. The Henderson Produce Company in Monroe City, Mo., had to build an addition to their plant in order to separate and dry eggs for shipment. *Speed was essential.* The contractor used Atlas High-Early cement for the floors and estimated one week's saving in time. He was able to place machinery on the floors before the building was finished. The addition was in operation in 60 days!

2. Running up the stair treads—fast! Even though the contract did not call for it, the contractor for the stair treads in a Cincinnati Housing Project used Atlas High-Early. He wanted to speed up the job and save lumber for forms. And he did. Use of Atlas High-Early cement instead of normal portland cement permitted removal of forms from treads in one-half the time. The job went faster and form costs were lower!

3. Storage room floor made ready overnight. A new plant at [redacted] needed a floor—on the double quick! Engineers and contractor decided on Atlas High-Early cement. The last concrete was placed about 4:30 P. M. At 8:30 the next morning, steel was being stored on it—as much as 1,600 pounds per square foot. This use of Atlas High-Early saved at least four or five days on an important war job.

* * *

Speed with economy is the reason why Atlas High-Early cement is specified and used so much today—speed in completing defense housing, cantonments, roads, airports, war production plants.

On almost any kind of concreting job where "Rush" is a must, rely on Atlas High-Early. In application, it's like normal portland cement and just as easy to handle. Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York City.

OFFICES: *New York, Chicago, Philadelphia, Boston, Albany, Pittsburgh, Cleveland, Minneapolis, Duluth, St. Louis, Kansas City, Des Moines, Birmingham, Waco.*

ENR-H-48

ATLAS HIGH-EARLY CEMENT

A UNIVERSAL ATLAS PRODUCT

The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • AUGUST 13, 1942 • VOLUME 129 • NUMBER 7

Idle construction equipment will be drawn into war work

No move toward "concentration" of manufacture seen likely as comprehensive survey gets underway. Canadian government agency inaugurates similar survey.

The War Production Board is finally taking definite action to uncover and release for war work the large quantities of used construction equipment that are now used only part time or for non-essential purposes.

The long-anticipated move (*ENR*, Apr. 16, p. 581) is starting with a survey designed to disclose the location, type, use, condition, and asking price of all used equipment. The Construction Machinery Branch of WPB has put a man in each of the thirteen WPB regional offices to start checking with dealers, state, municipal, and county governments, and contractors, on what equipment they have. The files so obtained will be kept up to date by supplying equipment owners with "change of status" cards on which they may report disposal of the machines.

A survey of road equipment held by local governments was made some months ago (*ENR*, July 9, p. 62) by WPB's Bureau of Governmental Requirements, but being limited to road construction equipment did not cover the field as completely as is now planned.

Principal device for putting into use equipment turned up by the survey will be refusal of allocations of new machines to contractors. Instead, contractors wanting a new piece of equipment will be put in touch with owners of available used equipment. From that point on it is the intention of the branch to leave the matter to negotiation between the parties. Undoubtedly, however, if an owner who has no war-essential use for his machine refuses to sell, use of WPB's requisitioning powers will be considered.

No concentration

Rumors circulating the last few weeks that manufacture of construction equipment is to be concentrated in a few plants appear to be without foundation. "Concentration of industry" is a method now being adopted by WPB for continuing small-scale production of non-military goods. Instead of cutting down all producers to a small percentage of their normal production—which is of course very inefficient—all producers are shut down except one or two who are kept working at capacity.

This question, however, does not arise in the case of construction equipment. Production of such equipment is now running about 30 percent ahead of 1941, and no immediate curtailment is in sight. Chief reason for this is that about 85 percent of the output of critical types of equipment—cranes, shovels, tractors, and roadbuilding equipment—is now going into direct military use. Ninety percent by weight of the industry's output consists of these critical types. Thus, even if it were decided to force the entire construction industry to rely on used equipment—which is not now under consideration—only a small cut could be made.

In a move closely paralleling that being taken by WPB, the Canadian Wartime Prices and Trade Board has undertaken to make a complete census of all construction equipment and allied machinery in the dominion.

Individual reports have been required on each piece of equipment owned by all operators, from governmental agencies to used equipment dealers, the only exception being farmers, miners, and mining corporations. Sixty-seven different types of machinery, covering all types of construction and road plant, are to be listed.

Reports must show whether the equipment is in operation, and if so, the nature of the work being done, so that its relevance to the war effort may be observed.

All changes in ownership of machines must now be reported to the Administrator of Farm and Construction Machinery and Municipal Service Equipment, at Toronto.

Reclamation projects given priority

The Bureau of Reclamation this week learned from the War Production Board how much of its program it can go ahead with and what will have to be deferred. The decision is surprisingly favorable. For months the bureau has not known where it stood, has been struggling along with comparatively low ratings, mostly A-3, and hoping for the best.

Anderson Ranch and Davis Dams are the only ones that will have to be abandoned. Both of these were started rather recently, Davis Dam with the definite recognition that it might not be possible to complete it. (*ENR*, April 23, p. 600). Construction will not stop immediately on either of these projects. Earthwork and similar operations that don't need much priority help will continue for awhile. Work will probably taper off gradually.

WPB, however, granted high ratings on a substantial program of hydro-electric projects now underway, a program which will provide an additional million kilowatts by 1944. Bulk of the program consists of additional generators at dams now largely complete. Ratings of AA-3 are granted for two 75,000-kw. units to be installed at Grand Coulee this year and of AA-4 on three 108,000-kw. units for next year. At Boulder Dam, one 83,500-kw. unit for this year gets AA-3 and another for late next year gets AA-4. Four units this year of 30,000 kw. each get an AA-3. Two units of 10,800 kw. at Green Mountain, to be installed next year, get an AA-4. All these ratings include necessary windup work on dams and power houses as well as the generators themselves.

Biggest surprise is the grant of AA-4 ratings to Shasta and Keswick Dams, neither of them scheduled to deliver power until 1944. The Shasta rating covers the dam and three 75,000-kw. units. The Keswick rating provides for bringing the dam up to the full originally scheduled height and installation of two 25,000-kw. units.

NBC broadcasts series on engineers and the war

Under the title of "The Engineer at War" the National Broadcasting Co., in cooperation with the five principal engineering societies and the O.C.D., is broadcasting a series of radio programs on its nationwide network each Thursday evening from 6:30 to 6:45, Eastern War Time, to acquaint the American public with war activities of engineers. Four programs have already been given, covering blackouts, protection against incendiary bombs and gas, battleship construction and bomb resistance of structures. The latter, one of the four programs in which civil engineers will take part, was given by Prof. H. E. Wessman, New York University, and Walter D. Binger, Commissioner of Borough Works, Manhattan, New York City. On Aug. 13, Rear Admiral Ben Moreell, chief, Bureau of Yards and Docks, and members of his staff, will discuss drydocks and ship repair bases. On Sept. 10 power will be the subject, and one of the principals will be John P. Hogan, consulting engineer, New York City. A week later the broadcast will cover the activities of the U. S. Engineer Corps in peace and in war, and will be presented by Major General Eugene Reybold, Chief of Engineers, or some member of his staff. Other programs will cover the manufacture of tanks, ships and planes.

R. L. Sackett, dean emeritus of the school of engineering of Penn State College and vice president of the American Society of Mechanical Engineers, heads the engineering societies' radio committee, of which the American Society of Civil Engineers group is composed of Waldo G. Bowman, chairman, Eugene L. Macdonald and Harold E. Wessman.

• • •

Condemnation proceeding started at Philadelphia

Philadelphia city authorities last week started to serve condemnation notices on properties affected by the proposed widening of the south side of Vine St. near the Delaware River Bridge approach. (*ENR*, July 16, p. 74).

T. C. Frame, chief engineer for the Pennsylvania Department of Highways, announced the city's action after a conference with John H. Neeson, city director of public works, Richard Woolsey, highway department attorney, and legal representatives of the city.

The Vine Street widening project, to cost about $50,000,000, is designed to eliminate serious traffic bottlenecks within the city. Frame said that raising of the structure does not involve any strategic materials and the clearing of the right-of-way can be carried forward at once.

Oklahoma City sees water resources sapped

With water consumption at a near-record rate that exceeded the capacity of the filtration plant on the Canadian River at Lake Overholser, Oklahoma City officials moved last week to obtain sufficient priority ratings for the Bluff Creek filtration plant to assure adequate water supply by next June or July.

The Bluff Creek project (*ENR*, May 7, p. 788), a $6,900,000 improvement, contemplates a dam—already under construction—on Bluff Creek, a pumping station on the downstream side of the dam, and a 48-in. dia. pipeline to connect this plant with the city's existing distribution system.

H. E. Bailey, city manager, said that unless construction of the 32,000,000 gal. filtration plant is started by September or October of this year, a pinch during the peak consumption months next summer is entirely possible.

City officials cited the increasing number of military establishments and war plants in the area immediately surrounding the municipality for the heavily increased water demand, which recently reached 23 mgd., as compared to peak loads of 18 to 20 mgd. in 1941. Capacity of the filtration plant now operating is only 22 mgd., but storage increases the capacity for a limited time.

Missouri town short

The town of Meosho, Mo., its population nearly doubled in the past year because of war work, may soon face water rationing, according to Mayor Glen Woods.

Pumps in the city's three deep wells are now working at capacity 24 hours a day, but are barely able to meet the demand, the mayor said.

Pittsburgh plans link

Anticipating an emergency that might disrupt Pittsburgh's water service, Frank M. Roessing, Pittsburgh public works director, has proposed to executives of two water companies that they lay cross-connections between their water mains to enable either plant to serve the other at any time.

Officials of the two companies, the South Pittsburgh Water Co. and the Pennsylvania Water Co., said they would put company engineers to work on the proposal immediately.

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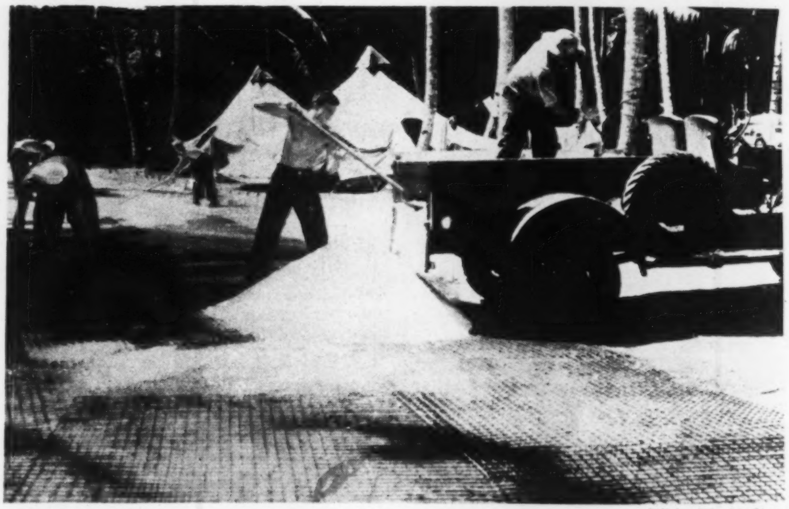
Ask trucker to pay for loss of bridge

A suit to collect $50,000 in damages for the destruction of a 650-ft. bridge over the Wabash River near Montezuma, Ind., recently was filed by the Indiana State Highway Commission against Russell C. Crawford, operator of a local trucking company.

The state contended that a tractor trailer, operated by an employee of the truck firm, crashed against one of the three spans of the bridge on Jan. 28, 1941, causing the structure to collapse.



Wide World Photo

"Seabees" rush road for war base

Members of the Navy's newly organized construction battalions are shown in one of the first action photos to be released, constructing a road in a new Southwest Pacific naval base. Steel mats are filled with pulverized coral rock to make a stable, smooth, easily visible roadway.

Evidence of the ingenuity of this branch of naval service is seen in the truck at right, which appears to be a converted scout car.

Organized some months ago (ENR, April 2, p. 509), the "Seabees" are a parallel organization to the Army's engineer regiments, and includes many skilled construction men.

Cement manufacture limited to three basic types for duration of conflict

WPB order is move to increase available storage space, reduce power consumption for manufacture. Twelve dam projects exempted

The long-awaited limitation order on the manufacture of portland cement was issued by the War Production Board on August 3, to become effective August 23. Designated Limitation Order L-179, it restricts manufacture to three types—general purpose, moderate heat, and high early strength—it prohibits the ear-marking of storage bins for particular customers, thus making storage capacity available to all purchasers, and requires cement to be tested according to federal emergency alternate specification E-SS-C-158a or ASTM specification C77-40.

In its announcement the WPB states that the requirements of the military construction program have greatly increased the normal demand for portland cement and that by restricting manufacture to a minimum number of types the total output can be brought into virtual balance with overall requirements. It is also a part of the purpose of the order to save 20 percent of the power and a considerable tonnage of alloy steels normally consumed by the cement manufacturing industry.

Exempted from the restrictions of the orders are twelve dam projects being supervised by the Bureau of Reclamation, the Tennessee Valley Authority, and the War Department. Exempt reclamation dams are Anderson Ranch, Shasta, Keswick, Friant and Davis Dams. The Army Engineers' Norfork is exempt as are the following TVA dams: Fontana, Douglas, Fort Loudon, Kentucky, Apalachia, and Ocoee No. 3.

Emergency alternate specifications looking toward this limitation order have been under development by the Federal Specifications Board and the American Society for Testing Materials for a number of months. As finally adopted early in June, the specifications of the two bodies are in complete agreement. Thus general purpose cement is defined by federal specification E-SS-C-191b and by ASTM specification EA-C-150-type 1; moderate heat cement is defined by federal specification E-SS-C-206a and by ASTM specification EA-C150-type 2; and high early strength cement is defined by federal specification E-SS-C-201a and by ASTM specification EA-C150-type 3.

In broad terms these emergency specifications differ from those in effect prior to the emergency by placing a limit on fineness so as to reduce grinding and power consumption; by raising the permissible autoclave expansion from ½ to 1 percent; by requiring tests at 3 and 7 days and not at 28 days; and by permitting the use of TDA as an addition in all three types and of vinsol resin in types 1 and 2.

With respect to storage, the limitation order states that "No manufacturer of portland cement shall allocate or continue the allocation of any silo, bin or other storage space to and for the exclusive use of the Army, the Navy, the U. S. Coast Guard, the U. S. Maritime Commission, or any other person."

Appeals from the order may be directed to the Director General for Operations, War Production Board, Social Security Building, Washington, D. C.

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Engineers build pontoon bridge in record time

With a goodly portion of the local rural population looking on, engineers of the 302nd Engineer Battalion recently threw a 425 ft. pontoon bridge across the Wateree river near Columbia, S. C., in two hours and 15 minutes.

The bridge was capable of supporting a light tank. Just as an extra measure the battalion then took exactly 12 minutes to construct a footbridge across the same stream.

A permanent steel bridge near the same point had required nearly six months to construct.

Rosoff awarded contract for Mexico tunnel work

Samuel R. Rosoff, Ltd., New York City, recently was awarded a contract for construction of the 8-mi. long El Mirador irrigation tunnel at Puebla, Mexico, 85 mi. southeast of Mexico City.

The tunnel is to be a 17-18 ft. dia. horseshoe-shaped bore, similar in cross-section to the Colorado River Aqueduct. It will be worked from two portals and a central adit, through rock, and will be concrete lined. The contract allows three and one-half years for completion, but the work is expected to be finished in a much shorter time.

Rosoff was low bidder at 22,476,000 pesos ($4,652,000 at current exchange). Other bidders on the work, all U. S. firms, were Morrison-Knudsen Co., Inc., Boise, Idaho; Utah Construction Co., Ogden, Utah, and Seaboard Construction Co., Chelsea, Mass. This is believed to be the first instance where a project of this kind and magnitude has been let by competitive bidding in Mexico, such projects having been done previously under negotiated contracts.

The work will be done for the Commission Nacional de Irrigacion of Mexico under supervision of the director of the commission, Adolfo Orive Alba, and the Secretary of Agriculture, Marte R. Gomez.

According to Fred W. Stiefel, chief engineer for Rosoff, there is no restriction on U. S. supervisors and technical men working on the project. The labor will be local, the Mexicans given opportunity to learn modern tunneling methods.

Wide World Photo

Build reservoir for evacuee settlement

Rushing to complete virtually a new city that will house about 10,000 Japanese evacuees from the Pacific Coast, construction workers are scooping out a million gallon water reservoir to provide sanitary and drinking water.

One of ten such centers to be operated by the War Relocation Authority (ENR, July 9, page 59) this center is known as the Heart Mountain Japanese Relocation Center and is located near Cody, Wyo. Its inmates will be kept busy reclaiming the barren sagebrush land around the settlement for use as farmland, in an attempt to make the center self-sustaining to as great an extent as possible.

Test blackout driving hazards in Ohio town

The village of Hebron, Ohio, recently became a "test tube" for federal authorities seeking to determine what road markings are needed to make for safe driving during blackouts.

The village, which has a normal population of 700, was selected because of the variety of pavement surfaces within its borders and because it is the center of considerable urban, rural and through traffic from and to nearby Columbus. For the test, 17 miles of streets were completely blacked out.

O. K. Norman and William G. Eliot, of Washington, D. C., representing the Public Roads Administration; Capt. E. B. Foster of the engineering section of the Office of Civilian Defense, and Harry E. Neal, chief engineer of the bureau of traffic and safety for the Ohio Department of Highways, were in charge of the test. Several hundred marking devices and signs were placed for observation.

From results, PRA will make recommendations as to proper methods of marking highways for blackouts, these recommendations to form the backbone of subsequent OCD orders.

Among preliminary results was the demonstration that pedestrians walking the streets or highways during blackouts should wear white from the knees down or carry white canes, since dimmed out auto headlights do not throw a beam more than a few feet above the ground. Illumination allowed to automobile headlights under blackout regulations is only 35 candlepower, as compared with about 60,000 candlepower on the normal headlight beam.

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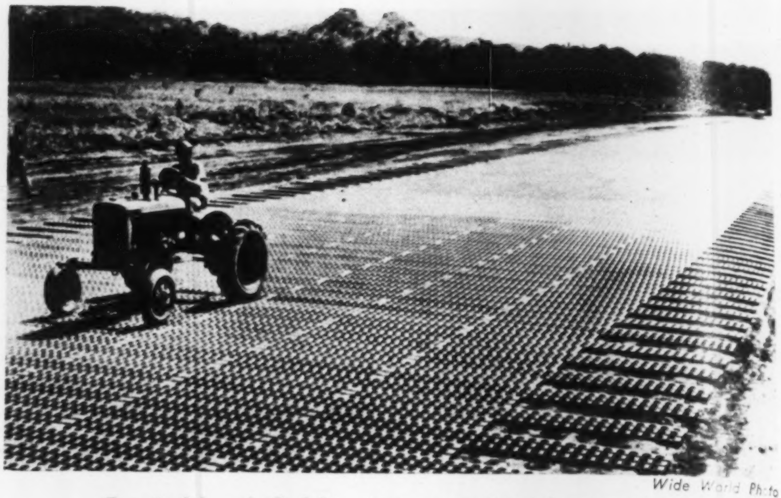
Artesian wells supply city during emergency

For the first time in many years, downtown residents of Charleston, S. C., recently received artesian water through the city mains when one of the pumping engines at a waterworks substation broke down.

Pressure in a standpipe located in the northern section of the city became so low after the breakdown that water officials called upon the fire department for aid. A pumping engine was put into service and an old artesian well, now used to supply the municipal swimming pool, was tapped. The engine was kept in service for two days, while the reservoir and standpipe were refilled.

Charleston's artesian wells for many years were the principal source of the city's water supply. In recent years, however, with the construction of reservoirs and pumping stations, the wells have been maintained only as fountains and to supply the swimming pool.



Wide World Photo

Portable airfield runways set up in war zone

A small tractor drives over an airplane runway of steel matting put down recently by American troops at a United States post "somewhere in the Pacific."

Developed recently was a means of quickly constructing runways capable of being used by the heaviest bombers, the steel mats are portable and may be placed by unskilled labor troops. Use of mats of this type frees military engineers of dependence on local supplies for paving and surfacing materials in regions where such materials are scarce.

Engineers to be hired for war work through USES

Firms doing war work have been asked by the War Manpower Commission to do all their hiring of engineers and other technical and professional personnel through the facilities of the U. S. Employment Service. The USES, now a subsidiary of WMC, expects to fill calls for men through the National Roster of Scientific and Professional Personnel, turned over to the WMC at the time the commission was created. To the roster are now being added names obtained from the occupational questionnaires sent to men who have registered for Selective Service.

The new policy is not compulsory. For the present it is merely a request. But like all such "voluntary" war measures, it will have a tendency to become compulsory. It's a clear warning to engineers who consider themselves available for war jobs to see that their names and records are included on the roster.

Purpose of the new policy is to prevent war contractors from raiding each other's technical staffs and from raiding university faculties.

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Complete Bonneville power transmission grid

The Bonneville Power Administration's 594-mile, 230,000-volt transmission in the states of Washington and Oregon has been completed, with energizing last week of the final section between Grand Coulee dam and Covington, Wash.

War-housing project opened to New Yorkers

Fort Green Houses, a state-aided $20,800,000, war-housing project in a congested area of Brooklyn, N. Y., will be opened to the first occupants on Aug. 17.

The project contains twenty-seven 6 story, four 11 story and four 13 story residential buildings covering 21 percent of a 39 acre site providing 3,501 living units. All structures are full concrete frames with brick exterior walls. Two of the smaller buildings are now ready for 120 families and six more buildings will be completed in September.

In contrast to the low-rent public housing projects, the apartments will be first made available to war workers in the immediate area, most of whom would be barred from subsidized housing. Lowest monthly rentals, including utilities, will range from $20.20 for two persons to $23.90 for nine-person families. Rents will increase according to the relative desirability of the apartment and the ability of the family to pay. Minimum rental will in no case be less than one-fifth of the family income.

The foundations for the project were built by Corbetta Construction Co. of New York. General contractor for the superstructure is D.M.W. Contracting Co. of Brooklyn. The concrete work, subcontract for which is held by Three-Companies, Inc., is the subject of an article to appear in Aug. 27 issue of *Engineering News-Record.*

The project is being built by the New York City Housing Authority with financing by the USHA.

Port work authorized to speed ore movements

Construction of ore docks at Escanaba, Mich., dredging of the harbor there and improvements of the railroad lines linking that harbor with the ore deposits in Wisconsin and with the ore docks at Duluth and Superior has been authorized by the War Production Board. Between twenty and thirty million dollars is to be expended.

Escanaba is on the northwest shore of Lake Michigan, the closest port of any size to the iron mines in the Ironwood region. Development of ore-handling facilities there will increase the rail haul for ore but will shorten the water haul, especially to the Chicago region. Also, the rail route to Escanaba will give an alternate route for handling at least part of the ore shipments in case of conjestion at the Soo locks or their early closing due to ice conditions.

Work to be done falls into two parts. The port of Escanaba is to be improved by construction of ore yards and docks and dredging of additional channels. In addition the rail connection across Michigan will be improved by ballasting the track, replacing ties, and strengthening bridges.

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WLB to make final ruling in AFL-CIO Frigidaire case

The War Production Board's Board of Review will not make the final ruling in the jurisdictional dispute between the AFL building trades unions and the CIO radio, electrical, and machine workers over painting work at General Motors' Dayton Frigidaire plant. Last week, when the War Labor Board permitted the Board of Review to try settling the case (*ENR*, Aug. 6, p. 196), it looked as if a test would develop of whether the Board of Review is capable of handling AFL-CIO issues. The board, set up to adjudicate disputes arising under the Construction Stabilization Agreement, has only AFL representation among its labor members.

As it turns out, the Board of Review will not attempt to make a final decision. It will hold hearings, prepare a finding of fact on the dispute, and make a tentative decision which will be presented to the War Labor Board for its approval. It is intended to hold separate hearings to hear AFL and CIO testimony.

There is a strong possibility that the CIO will refuse to appear before the Board of Review. In that case the issue will automatically go back to WLB, which will doubtless follow the course it threatened to take last month and appoint an arbitrator with power to make a final decision.

TVA MOBILE X-RAY LABORATORY
HEALTH AND SAFETY DEPARTMENT

Mobile laboratory aids TVA's health program

To help safeguard the health of its thousands of employees on construction and other jobs scattered through six states, the Tennessee Valley Authority recently put this traveling X-ray laboratory into service. TVA periodically makes lung examinations of hundreds of employees, and the mobile laboratory will greatly widen the scope of service.

Additional advantages of the traveling laboratory include minimum loss of time by workers who can be given a complete medical examination on the scene of their work.

The traveling laboratory is operated by A. E. Turner, principal medical technician, who for three and one-half years was X-ray technician in field studies with the U. S. Public Health Service.

When not traveling, jacks suspended below the bus chassis are let down and the vehicle is hoisted on them, so that the bus will be steady and level while X-ray work is in progress. The bus is air-conditioned.

Contractors form pools to get war building work

Acting under the auspices of the American Contractors War Advisory Committee, groups of small contractors in the New York metropolitan area are organizing pools to bid on local war construction work of all types.

At least a half dozen such pools are expected to be organized and in operation before the end of August. Each pool will consist of ten or more small contractors, whose combined assets will be large enough to entitle them to full consideration by the various war agencies. Members of each pool will be required to have full equipment and an established reputation for reliability.

According to P. H. Wolf, head of the contractors committee and chairman of the Association of Plumbing and Heating Contractors of Greater New York, the pools are being formed to combat unemployment in the metropolitan area by keeping small shops and contracting firms, with their highly trained specialists at work.

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Ohio River division engineer office to move

The Ohio River division office of the U. S. Engineers, at Cincinnati, Ohio, since 1933, will be moved to Columbus, Ohio, next month, according to Col. Charles L. Hall, division engineer.

The division employs 450 persons, and has supervision over an area of 203,900 sq.mi. The move, according to Colonel Hall, was dictated by need for closer cooperation with the fifth service command, now located near Columbus.

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Huge drydock raised by Navy in Eritrea

U. S. Workers, under direction of Capt. Edward Ellsberg, salvager of submarines, last week were reported to have started to nullify Italian attempts to damage beyond possible use the port of Massawa in Eritrea.

One of the first operations completed in the immense salvage job at the port was the raising of a drydock capable of handling 10,000 ton cruisers. Working with 13 divers who had only two diving suits among them, Ellsberg found that the drydock had been sunk when the Italians dropped a 200 lb. bomb in each of eight watertight compartments. Diving began May 11 and the dock was afloat May 20.

None of the holes except those on the top airtight locks were repaired in the floating operation. Ellsberg recorded the Eritrean heat at 149 degrees in the center of the dock and 163 degrees on the steel plates where the men were working.

Twenty-six ships and a smaller floating dock, capable of handling destroyers and ordinary freighters also were sent to the bottom by the Italians when they abandoned the port. Captain Ellsberg has said that all the vessels at the other docks can be salvaged.

BRIEF NEWS

The Pennsylvania highway department has announced that more than 90 miles of road were widened by one or two additional traffic lanes in the last fiscal year, by labor supplied by the WPA. Fifty-three miles of two-lane pavement were widened to three-lanes, and 37 miles of two-lane pavement to four traffic lanes, the department said.

Engineers of the Denison, Tex., division of the Corps of Engineers are overseeing the removal of 2,499 graves from the area to be covered by the waters of Denison Dam reservoir. The graves are contained in 40 cemeteries in the area.

The engineering districts of Iowa State College reported 1,022 students as the second term summer enrollment was completed recently.

About 100 Indiana water system officials recently gathered at Indianapolis for a two-day emergency meeting of the Indiana Waterworks School, sponsored by the State Defense Council and the State Board of Health.

Oregon motorists will be required to come to a full stop before driving across any of the state's 32 main line railroad crossings, under an order of the Oregon Highway Commission. The ruling becomes effective as soon as signs can be installed at the crossings.

About 60 laborers and foremen in the Columbus, Ohio, city engineering division have been discharged. City officials said the move was necessary when freezing of the use of bituminous materials for street work cut down the amount of work available to the department.

Passenger car traffic on the Pennsylvania Turnpike dropped from 232,107 in June, 1941, to 96,758 cars in June of 1942. Truck traffic, however, increased from 20,169 to 29,200 in the same period, according to the Turnpike Commission.

The Portland, Ore., city council recently adopted an ordinance relaxing the city's housing code for the duration of the war to permit existing home facilities to be used for housing war workers. The ordinance removes zone restrictions so that additional families now may be housed in single family dwellings. It also permits conversion of family garages into living quarters, and allows empty stores and offices to be used for the same purpose.

Since its incorporation in February, 1941, Wartime Housing Ltd., of Canada, has received approval for building projects totaling 11,842 homes and 85 staff houses and other structures, at a total cost of $48,021,761. Of the housing approved, 5,485 houses and 72 staff houses are already completed, at a cost of $33,448,715.

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Missouri board tightens state registration law

Engineers and architects not specifically exempted from provisions of the registration law passed in Missouri in August of last year and who continue to practice in the state after Oct. 10, 1942, are to be regarded as practicing in violation of the law, according to a decision reached by the Missouri State Board of Registration for Architects and Professional Engineers at its semi-annual meeting held in Jefferson City, July 13. Exempted from the law are land surveyors, landscape architects, insurance inspectors, stationary engine operators and employees of registered architects and professional engineers.

Section 16 of the registration law is what is commonly known as a "grandfather clause" permitting registration without examination under certain conditions for architects and engineers who were practicing at the time the law went into effect. The provisions of that clause expire on Oct. 10 of this year.

New houses replace defense workers' shacks

War workers in defense plants near Pryor, Okla. are gradually moving into prefabricated houses like that shown under construction in the upper picture, after long residence in shacks such as that also shown above, trailers, rooming houses and similar make-shifts.

There have been long delays in the start of the work on this project—which contemplates construction of 500 such houses on an 80-acre site—centered around inability to obtain plumbing and electrical supplies. Although the houses were scheduled to include bathtubs, none could be obtained and construction is now proceeding, using temporary shower installations. The W. R. Grimshaw Company of Tulsa, general contractor on erection, expects to complete the 500 houses in less than 60 days with structures going up at the rate of one every eleven working hours.

Each house has a living room, kitchen, bath and closet space. Sizes are varied from one to three bedrooms. Costing from $2,500 to $3,300 each, these houses are of frame construction completely insulated with spun glass; asphalt roofing and siding; weatherstripping in windows and doors, and hardwood floors.

Prefabrication for the unit was done by the Southern Mill & Manufacturing Co. of Tulsa.

OBITUARY

Milton Theodore Thompson, 72, retired civil and electrical engineer who had assisted in the construction of some of the world's largest power dams, died Aug. 10 at his home in Upper Montclair, N. J. Mr. Thompson, who retired 11 years ago, was field director of American consultation in the construction of the Dnieper Dam in Russia, and construction superintendent for the nitrate plant at Muscle Shoals and chief hydroelectric engineer for the Necaxa project, then the largest power dam in the world. Other work included the Keokuk project, the first hydroelectric dam across the Mississippi River.

Robert Lafayette Hart, 35, Hickory, N. C., civil engineer, died recently. At his death he was supervisor of concrete and steel work on army construction at Camp Butner, N. C.

Charles W. Francisco, Missouri State Highway Department division engineer at Willow Springs, Mo., died recently. He had been with the department since 1920.

Sherman Campbell, 75, retired civil engineer and surveyor of Fernandina, Fla., died July 31.

Edward M. Boggs, 61, retired consulting engineer of Piedmont, Calif., died there July 28.

Stephen J. Struben, 62, Monroe, La., construction engineer, died there recently. At the time of his death, he was chief engineer for the Interstate Natural Gas Co.

Waldo Wendell Coulter, engineer with the Washington State Highway Department at Olympia until his retirement two years ago, died Aug. 1.

A. Freeman Patton, retired construction engineer of Philadelphia, Pa., died at the University of Pennsylvania Hospital Aug. 5.

Bert Wingard, a construction engineer who had been working on an Army project in Peru, Ind., died there recently.

Harry H. Brittingham, 36, for 14 years a teacher of engineering drawing at Ohio State University, died at Columbus, Ohio, recently.

CONTRACTS AND CAPITAL

Engineering Construction volume for the week totals $200,600,000, an increase of 22 percent over a week ago, and 119 percent above the total reported for the corresponding week last year. Private construction is 32 percent higher than in the preceding week, but is 34 percent lower than in the 1941 week. Public work gains 22 percent over last week and 152 percent over last year due to the increased volume of federal construction.

The current week's construction brings the 1942 volume to $6,471,393,000, an increase of 57 percent over the $4,125,233,000 reported for the 33-week period in 1941. Private work, $422,611,000, is 51 percent below the period last year, but public construction, $6,048,782,000, is 85 percent higher as a result of the 134 percent gain in federal work.

In the classified construction groups, gains over last week are in waterworks, sewerage, commercial and public buildings, earthwork and drainage, and unclassified construction. Increases over the 1941 week are in waterworks, sewerage, public buildings, and unclassified construction.

New capital for construction purposes for the week totals $1,023,000. This compares with $17,501,000 for the week last year. The current week's new financing is made up of $958,000 in state and municipal bond sales, and $65,000 in corporate security issues.

New construction financing for the year to date, $9,509,648,000, tops the volume for the 33-week period a year ago by 77 percent.

CONTRACTS

(Thousands of dollars)

	Week Ending Aug. 14 1941	Aug. 6 1942	Aug. 13 1942
Federal	$53,596	$146,380	$182,967
State & Municipal	21,499	9,319	6,744
Total public..	$75,095	$155,699	$189,711
Total private.	16,491	8,274	10,889
TOTALS	$91,586	$163,973	$200,600

Cumulative
1942......(33 weeks).....$6,471,393
1941......(33 weeks).....$4,125,233

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1941 33 weeks	1942 33 weeks
NON-FEDERAL ...	$970,537	$542,750
Corp. Securities..	290,724	163,849
State & Mun.....	316,543	167,782
U.S.H.A. loans...	30,399	......
R.E.A. loans.....	100,500	......
R.F.C. loans.....	69,371	128,419
Fed.-Aid—Highways	163,000	82,700
FEDERAL	$4,397,589	$8,966,898
TOTAL CAPITAL..	$5,368,126	$9,509,648

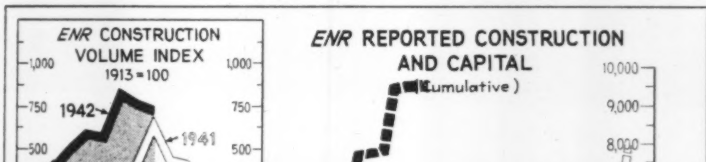
ENR INDEX NUMBERS

Index Base = 100		1913	1926
Construction Cost...	Aug. '42..	281.61	135.37
Building Cost......	Aug. '42..	225.39	121.84
Volume	July '42..	736	323

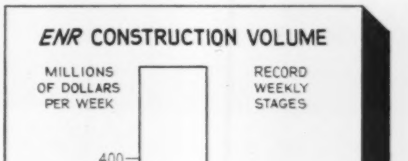
FHA MORTGAGES

	Week Ending Aug. 9 1941	Aug. 1 1942	Aug. 8 1942
Selected for appraisal			
Title II....	$33,026	$5,697	$6,074*
Title VI....	$3,881	$13,083	$15,573*

*Subject to revision.



ENR Business News



Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Guns and Water

Sir: I regret to note the closing sentence in your editorial in the July 2 issue, which states, ". . . the time has come when we can't have both guns and water."

How can we have guns without water for the makers of guns? It is true, however, that the time has come when we cannot make guns and *waste* water at the same time.

I suspect that you yielded to the impulse to create an epigram, a form of literary dissipation to which I must confess an addiction.

E. Sherman Chase
Metcalf & Eddy
Boston, Mass.

(Literally, we can't produce guns without water. But WPB statements indicate that water service may have to be allocated or curtailed because essential metals are not available for the extension of water supply facilities.—Editor.)

Conservation through Design

Sir: A number of recent letters relative to the use of higher unit stresses and adjusted safety factors in order to conserve steel have been read with considerable interest. Mr. Benscoter's letter (*ENR*, June 18, 1942, p. 972), however, draws attention to a situation which merits more serious consideration at present than a blanket change in unit stress specifications and, in the opinion of the writer, the elimination or reduction of the "factor of ignorance" would affect a considerable saving of steel, especially in reinforced-concrete structures. Mr. Benscoter states that "25 percent of the steel being used in reinforced-concrete structures could be eliminated by expert stress analysts, and now that we need them, none are available." While it is agreed that the need for them is real and in some cases acute, and that the use of undergraduate formulas is not sufficient for modern design, we at least ought to make efficient use of what we have. A very considerable saving would be effected and more designs with consistent factors of safety would result if an intelligent use of the methods of stress analysis as taught in the average undergraduate course were more generally made.

There are many men in our engineering offices with good backgrounds of mathematics and mechanics who, with proper guidance, are competent to produce technically correct designs, but whose talents are not made use of because of "lack of experience" or some other factor which keeps them engaged on sub-professional work such as detail drafting. By the time some of these have acquired enough "experience" to begin doing original design work, many of them have forgotten their mathematics and mechanics and, with the aid of a couple of handbooks, begin following in the footsteps of many of their elders. To make proper use of the ability of some of these men may require a certain amount of supervision in order to keep their work consistent with the demands of the job as a whole, but as long as an active supervisor can judge his work from this viewpoint, it does not seem necessary that every designer or stress analyst be able to do so from the first.

The argument against technical excellence in design analysis on the part of some practicing engineers is that quality of construction is still not consistent with advanced design and that loadings are in many cases too indeterminate to warrant great accuracy in stress analysis. These arguments are not always borne out by facts. The writer believes that, in almost every case, there is ample information available regarding loading to warrant correct design and that construction methods and inspection are certainly keeping abreast of design.

The excuse for rule-of-thumb design on the ground that technical analysis is excessively time consuming is also baseless. In every case, in the experience of the writer, where there has been an opportunity for comparison, the technical design compared favorably; but even though the technical design did require slightly more time in the office, the design produced by the expert usually contained so many time-saving features of construction, and his plans were so clean-cut and concise, that a great saving of time as well as material over poorly designed structures was always made.

John B. Hollyfield
Huntsville, Ala.

Bridge Design Logic

Sir: Recent study, due to the desire to save steel, has resulted in the suggestion that increased unit stresses be used in design, and in bridge work increases from the present basic tension stress of 18,000 lb., to 20,000 lb. or 24,000 lb. have been seriously considered, with a recommended design load of Cooper's E-72.

The increase in unit stress, if the same design load is used, has the immediate effect of reducing the amount of steel used and has the ultimate effect of causing the structure to become obsolete at an earlier date due to the increase in engine weights.

Present A.R.E.A. specifications allow a unit design stress of 18,000 lb. for new construction, while for the investigation of old structures (carrying loads exceeding the design load) eight-tenths of the yield point, or 24,000 lb. if the yield point is not known, can be used. With the higher unit stresses the condition of the structure has to be considered and computations have to be made in detail, including the secondary stresses. It would appear from this that 24,000 lb. could be used with safety for new construction, with, of course, certain changes in the specifications.

If 24,000 lb. is used, the design load should be the heaviest load that may be operated over the structure. If this load is not used the strength of the bridge may limit the loads using it before it is finished. For instance, the A. R. E. A. specifications for bridges recommend using a load of E-72 for design. If this design load were used with 24,000 lb. for the unit stress, there are engines now in existence that could not safely cross the bridge.

The demands of the present emergency and the needs of the future can best be met by designing our bridges for the ultimate load which it is expected will cross the structure and using a unit stress of 24,000 lb. If the unit stress is increased from 18,000 to 24,000 lb. and the design or ultimate load is increased from E-72 to E-96, there will be practically no difference in design. If the bridge is on a branch line which will never have a load in excess of E-45 operating over it, it should be designed for that load, using a unit stress of 24,000 lb., and a saving in material will be effected. If the bridge is on the main line of a railroad which will never use equipment in excess of E-60, it should be designed for that load using 24,000 lb. unit stress, and material will be saved.

It appears from the foregoing that consideration given to the increase in unit stress has followed the wrong approach. In considering the matter, emphasis has been placed on the safe use of higher unit stresses for present loading, while the safe operation of future loads, and the determination of what these loads will be, should govern the design.

Crosby Miller
Bridge Engineer,
The Chesapeake & Ohio Railway Co.
Richmond, Va.

Footings without Steel

Sir: In his article "Wall and Column Footings without Steel," Victor H. Bergman in *ENR* July 16, 1942, p. 114, considers shear in footings in his discussion but does not take it into consideration in his design. Using the same basis for design as Mr. Bergman, but taking into consideration the shear, equations 1 and 3 below may be developed. Solving equations 1 and 2 for f'_c, equating and simplifying, Equation 3 is obtained, which gives the value of d in terms of b and L. Equation 3 is theoretically correct and will hold for any values of column load or soil pressure.

Applying Equation 3 to Mr. Bergman's example (Fig. 4) and assuming the bearing to be 3 ft. square and a trial $d = 36$ in., which will reduce the effective soil bearing to 3,150 lb., one obtains $L = 10$ ft. 6 in. and $d = 34$ in.

For concrete columns or pedestals, using the design limits set forth in the article, the equation for moment and shear reduces to Equation 4, where the dimensions are in inches.

$$M = \frac{P}{4}\left(\frac{L}{3} - \frac{b}{3}\right) = 0.03\, f'_c\, \frac{Ld^2}{6} \qquad (1)$$

$$v = \frac{P}{4bd} = 0.02\, f'_c \qquad (2)$$

$$d = 1.33\, b\left(1 - \frac{b}{L}\right) \qquad (3)$$

For a concrete column or pedestal

$$d\, 1.33\, \frac{(b + 4\text{ in.})\left(1 - \frac{b}{L}\right)^2}{1 - \left(\frac{b + 4\text{ in.}}{L}\right)^2} \qquad (4)$$

W. A. McCracken
Office of Frederick R. Harris
Houston, Texas

Saving Steel by Higher Stresses

Sir: Do American designing engineers want to help the war effort by literally producing themselves a minimum of 1,000,000 tons of additional steel annually? The answer, of course, is "yes." The solution is amazingly simple — increase unit stresses one-third. If you want proof just make a few estimates yourself—if you don't have time then refer to Prof. Carlton T. Bishop's letter (*ENR* June 18, 1942 p. 973).

Summarizing Prof. Bishop's findings the average savings on the five jobs studied would have been 14 percent. Although this study covered only building and truss work this same percentage—or higher—would hold true for heavy shipbuilding construction since the plate thicknesses now used for this work run from a minimum of ⅜ to ¾ in., and it would generally be entirely feasible to reduce these thicknesses in proportion to the higher stress.

Unfortunately, Prof. Bishop did not carry this to its staggering conclusion; this 14 percent applied to America's present day structural and plate capacity of about 14,000,000 tons per year would result in saving 2,000,000 tons! If bar size material, which is used structurally, and reinforcing rods are also included then this total might approach 3,000,000 tons! However in order that we definitely not delude ourselves let us assume only a 1,000,000-ton saving. Do you know what 1,000,000 tons of additional steel would mean in terms of additional cargo boats? A 10,000-ton Maritime Commission cargo ship requires less than 4,000 tons of plates and structurals. One million tons would build 2,500,000 tons of ships—250 boats or more than we built in 1939, 1940 and 1941 combined.

Is it not then time that we structural and ship designers insist immediately on using these higher stresses? In the case of ships the steel saved causes still another important saving—the lessening in the total weight of the ship and the consequent increase in its cargo-carrying capacity. In the case of structural work engineers have for years used a 24,000-lb. stress for temporary and emergency structures and no serious failures have occurred on account of this. Do not these times, involving the lives of the finest youth of our land, constitute a greater emergency?

This discussion is based on using carbon structural steel A.S.T.M. Specification A7-34 or A9-34 with a minimum yield point of 33,000 lb. per sq. in., this being the standard material now furnished by all American mills for this purpose. It is to be noted in this regard that actual mill test reports on materials manufactured to the above specifications show even higher yield points. With this in mind and the further fact that the usual loading assumptions made are considerably in excess of those encountered, except on rare occasions, it should not be difficult for us to decide to take this step, which is so important to the welfare of our country at the present moment.

Through conferences between the officers of our engineering societies, the American Institute of Steel Construction and certain government engineers, this matter could be settled in a short space of time.

Gætan M. Zucco
Structural Engineer
Seattle, Wash.

Air Raids and Water

Sir: I would like to call attention to a statement in the article on "Air-Raid Organization Measures for Water Supply Protection" (June 18 issue, p. 92). Here it states that the public will be informed by radio not to drink water in case of an air raid because the purity of the water might be impaired. As far as I know, radio stations are shut down when air raids are approaching so that enemy planes will not be aided in locating the station by a direction antenna. I may be wrong altogether, but as I understand it, these instructions are to be given just shortly before the raid. I wonder if the water supply officials have kept this in mind.

Herman Tachau
Chicago, Ill.

(It is true that radio stations are not to operate during an air raid. However, the plan in Chicago is to keep citizens advised by radio concerning water quality immediately *following* air-raid damage and until such time as complete safety is assured—Editors.)

EDITORIALS

VOLUME 129 NUMBER 7

August 13, 1942

Pre-assembled ships

THE pre-assembly of large sections of steel vessels probably has done more to speed up construction than any other feature of modern shipbuilding practice. Forepeaks, afterpeaks, deck-houses and inner bottoms have become ready-made items that are taken "off the shelf" and put together on the ways. Within recent weeks a further development of the plan for pre-assembly of inner bottoms at one yard proposes to decrease time on the ways chargeable to this item from seven to two days. At another yard plans have been developed for handling pre-assembled units weighing as much as 280 tons. More progress doubtless will be made, for up to some practical limit yet to be determined the pre-assembly plan distributes the assembly operation and gives men room to work, decreases the risk of delaying other operations when some minor interruption occurs, and greatly shortens the time required for assembly on the launching ways. For the present, pre-assembly still offers opportunities for greater development.

Improved Airport Drainage

TWO YEARS AGO, when construction of scores of airports was begun as part of the defense program, data were lacking as to the best types of drainage facilities, and there was a shortage of engineers trained in this type of work. Today, after the most intensive airfield construction period in the nation's history, which has seen airbases located under the widest possible range of soil and rainfall conditions, fundamental knowledge of airport drainage should be much improved. At least there is a larger variety of airport drainage designs available to serve as a basis for such knowledge. One of these designs is described in this issue and three others were the subject of an article in the June 4, 1942, issue. Some of the layouts now being used, as well as the type of pipe and drains employed, may prove of limited value, but the program as a whole can be considered as a rapid advancement in a new section of an old field of engineering. Equally important, a group of airport specialists is now available for design and construction of future fields. Airport drainage design knowledge is distinctly on the up-grade and, when experience records of existing drainage layouts are available in volume, it should be possible to develop a very specific list of accepted design principles.

The Importance of Versatility

ONE of the principal requisites of the civil engineer and construction man today is versatility. Thus the work described in two articles in this issue is typical of operations into which the war has taken engineers and contracting organizations. One Pacific Coast group, classed as a bridge and heavy construction contractor, crossed the continent and, on a war housing project, is constructing four-room cottages at an unprecedented rate. Other construction groups have turned to shipbuilding where they are making records in another recently unfamiliar field. Each day's news discloses engineers in some line of work that a few months ago was new to them, yet when production must be stepped up and new ideas and alternate materials developed, many of the honors for outstanding success have gone to those trained in the art of construction. There is a moral in this for those who, in doing their usual engineering and construction tasks in normal times, are tempted to fall into a routine that permits no practice of versatility. Versatility is developed most easily by keeping the spark of ingenuity alive.

Long Belt Conveyors

THE CONVEYOR-BELT SYSTEM that delivers aggregate from the Redding gravel pit to Shasta Dam is 19.2 miles long, if the return portion is included. Many questions arise about operating experience on such a belt. Are the transfers from flight to flight satisfactory in all respects? Is there much "grinding up" of material? Do different slopes show different rates of belt wear? In general, what are the operating problems and how have they been solved? These are questions that should be on record in the interest of progress of the art. Other long belts doubtless will be built and their successful operation may well come about more speedily if the lessons learned at Shasta are put on record. Operating experiences such as those relative to the long belt recorded in this issue probably outrank the importance of the descriptions, published earlier, that tell of the construction features. The designer is trained to analyze structural requirements but there is no training course on anticipating operating experiences.

A Priceless Possession

ENGINEERS IN PUBLIC SERVICE owe a debt of gratitude to Governor Hurley of Connecticut for having put into concise form a sound philosophy toward career men in such service when he wrote his finding with respect to charges of misconduct entered against Highway Commissioner William A. Cox of that state. "I recognize," said Governor Hurley, "that only the highest reason and surest proof can justify the destruction of the honor, reputation, and career of a public servant against whom no claim nor proof of dishonor has been made. Through my study of the matter I have not been unmindful of Commissioner Cox's varied career in the field of engineering. . . . The acquisition of his professional status required years of study. This status is not a possession to be trifled with except on convincing proof of willful misconduct or neglect in the discharge of his official duties. I do not find this misconduct or neglect present. . . . Therefore, the order of suspension is revoked."

In making his findings the governor made a highly desirable distinction that is too frequently overlooked in weighing charges against a public servant. Grave charges of "misconduct, material neglect of duty and incompetence" had been filed against Commissioner Cox (*ENR* Aug. 6, p. 188), and many days were spent by a referee in exploring them. In weighing the referee's findings of fact the governor distinguished between what he characterized as "errors and inadequacies of judgment and in management" and actual misconduct of the engineering work of the highway department. He found errors and inadequacies that he said warranted public attention and correction, but these he said did not justify action so drastic as to ruin the career and destroy the reputation of the man against whom the charges had been brought.

Too frequently such skillful balancing of the scales of justice has not been applied to the weighing of like charges. Reputations have been ruined for actions that warranted nothing more than a severe reprimand, because someone "had to be the goat" to appease public clamor. All those who know of Commissioner Cox's high ideals of professional and public service will be relieved that he was not thus victimized, while engineers everywhere can take courage at Governor Hurley's statesmanlike decision, as well as acquire from it a new appreciation of their individual responsibilities. Worthy of special note is his caution against action innocently taken that opens wide the doors to charges that in the end may destroy an engineer's most priceless possession.

A Real Inventory At Last

ANNOUNCEMENT by WPB that the Used Construction Machinery Section of its Construction Machinery Branch is going to undertake a nationwide inventory of used construction machinery is the best news of the week. Just such an inventory has been needed for a long time, and was, in fact, urged in these columns nearly four months ago, when it became apparent that the construction machinery problem was being viewed in an alarmingly nonchalant manner by officials in Washington. At that time the Army and Navy had not enlightened the WPB as to their overall requirements; the WPB was concentrating its efforts on an inventory confined to used road construction machinery; and certain planners were grouping construction equipment with washing machines and typewriters as products that existed in sufficient quantity to warrant stopping their manufacture altogether. In short, lacking the facts, and trying only half-way measures to get them, government officials nevertheless were jumping at conclusions that, if wrong, could adversely affect our war preparations.

It is gratifying to note that the WPB inventory is to cover all of the used construction machinery in the country; that its purpose is to reveal the availability of each machine for war construction; and that it is going to be done rapidly so that it will not be out of date before it is finished. One of the most useful features of the inventory is the proposed method for keeping it up to date by requiring construction machinery owners to file "change of status" cards whenever they rent or sell a machine or move it to another job. Presumably, a like check will be kept on new equipment.

With all of this information readily available in each regional office of the WPB, war construction can be planned and carried out with much greater efficiency than heretofore. Furthermore, only by knowing what we have can we decide on what and how much we must continue to manufacture. Few more basic or important decisions have been made by the WPB than this one to undertake a complete, nation-wide and quick inventory of used construction machinery.

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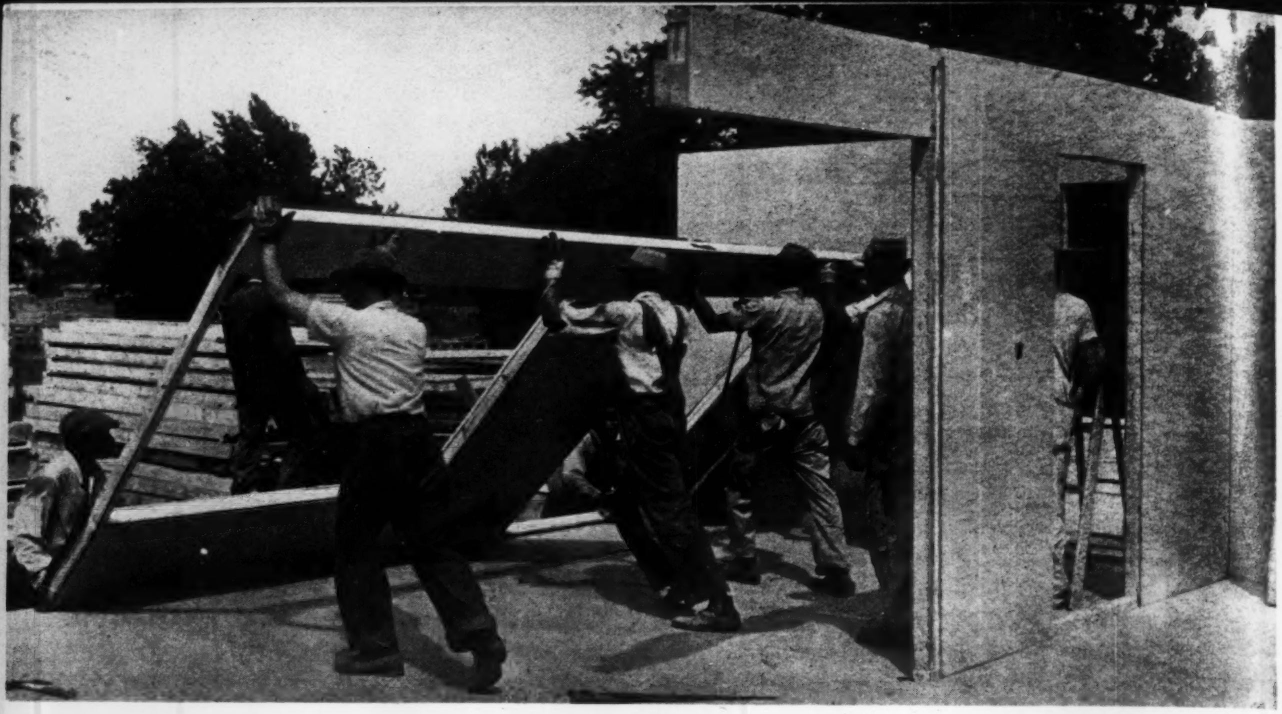


Fig. 1—Pre-assembled sections rise rapidly to form houses on a 5,000-unit project.

5,000 Houses in 5 Months

Contents in Brief—*Near an important war center 5,000 pre-fabricated and partly pre-assembled demountable houses are being built in five months time to relieve a critical housing shortage. There are 53 pieces of framing in a house, each of which can be handled manually. Use of templates for measurements and jig platforms for pre-assembly minimize errors and speed the work. Erection is divided and scheduled so each of several successive operations requires 15 minutes.*

TYPICAL ASSEMBLY LINE METHODS of pre-fabricating parts and bringing them together at a scheduled time and place at a coordinated speed make it possible to complete 300 homes per week on a 5,000-unit, war housing development near an east coast shipyard. Each piece in the structure—every board, every length of pipe, every electrical facility—is made up in advance and assembled into the largest unit that can be readily handled manually.

The standard design is a one-story 24-ft. 3-in. x 28-ft. house with two bedrooms, living room, large kitchen and bath. No basement is provided, a coal-fired circulating heater being set in an alcove and a large storage space provided in a closet off the living room (Fig. 7). The houses require 168 man hours of labor in the fabricating yard and 150 man hours for assembly; they cost just under $3,000 ready to move into.

The structure is a design of Precision Built Homes offered by the Homasote Company, who manufacture an insulating-board used extensively in the houses. Despite the admittedly temporary need for the houses in their present location they are being constructed of the best materials obtainable. Almost indestructible redwood is used for weatherboarding; plywood sheathing over the rafters supports a composition shingle roof; inside walls and ceilings are of insulating board glued on; and the floors are a single layer of pre-finished oak but are insulated underneath.

The pre-assembly design feature of the houses provides for rapid dismantling and easy removal to other areas after their present need has passed. The sections are of a size that can be transported over highways or railways to follow a shift in housing requirements. The typical building can be demounted in three hours and, once at the new site, reassembled in about the same time, including the installation of utility connections.

A schedule of completing 60 to 70 houses daily, and 5,000 houses in five months, requires a steady flow of each of the essential parts to the building lot with a minimum number of operations at the house itself. To accomplish this a fabrication plant was established at an old fertilizer factory, which was available with desirable railroad trackage, a storage area and a large building that could be reconditioned for preassembly of the parts. The yard is planned for several different production and fabrication lines, each converging at an area where material is assembled into one of the demountable sections of the finished house. The plant is ten miles from the erection site, but as the preassembled sections must be loaded on trucks for transport to the housing area the long haul adds little to the cost of the project.

Standard lightweight materials

Light lumber and the insulating board are the basic ingredients of the houses. The lumber is not larger than 2x4 or 1x6-in. pieces, except for the floor frame and joists, which are

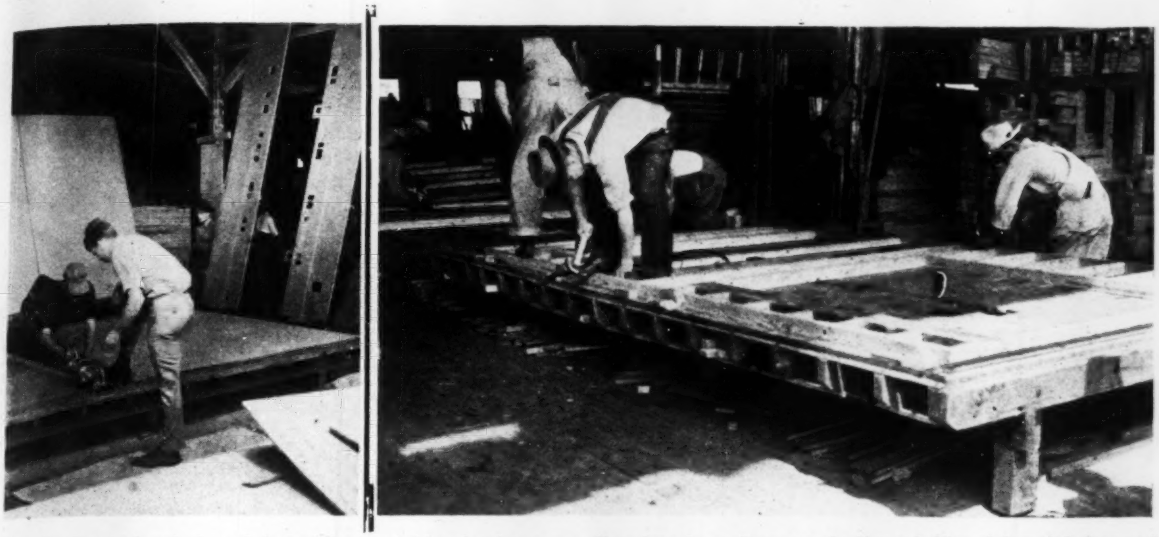


Fig. 2—Pressed pulp-board is cut by portable circular saw. Openings in wall are made through hinged templet dropped on the jig tables. At right is assembly jig for a wall section. Note the pre-fabricated pieces in numbered racks at right, installation of electric wiring, and convenient pockets under table for small pieces and tools.

2x10 and 2x6 in., respectively. No lumber is purchased over 14 ft. long and no special sizes or lengths are required, thus making it possible to take advantage of the general open market.

Insulating board is 15/32 in. thick and is manufactured largely from wastepaper. The board is sufficiently hard to withstand much abuse, and it can be cut, nailed and sawed by ordinary carpenter's tools much more rapidly than can lumber. On many jobs this board has been used for exterior sheathing, as well as for subflooring and insulation over the ceiling and as sheathing under the roof shingles. Due to present scarcity of the material and inability to get machinery to manufacture it in larger quantities, it is used only for exposed interiors on the Norfolk work.

Use of lightweight materials makes it possible to do all of the fabrication with portable machines, a large number of which are in use. Each production line is equipped with a number of radial saws that can be adjusted for any miter or bevel and can be used for rabbitting and dadoing as required. Also on the production line are portable drills, mounted in fixed frames, to bore the holes necessary for bolted connections in the pieces.

No measuring is done on the production line. Instead, every piece of the building is assigned a number and a template is made for that particular piece. The templates are then used to set the saws, locate holes to be drilled, and to determine the exact size of the members. Each piece is plainly marked by code numbers as to its place in the house and to identify the saw and the line at which it is fabricated. If any errors in the piece are found they can be traced easily to the proper table and the cause of the error rectified.

As the materials are fabricated, they are stacked for quick pickup and transportation by a motorized lumber carrier to the point in the assembly line where needed. Each fabrication line is arranged to handle several different pieces and the work is on a definite schedule to produce the number of pieces required daily. Most of the fabrication lines are in the open but they are covered by a canopy to avoid the effects of sun and rain and yet take advantage of natural light and breezes.

The available large building is used for both fabrication and assembly, with the outside bays utilized mainly for fabrication and the interior bays for assembly. In each of the assembly bays two overhead traveling cranes operate the full length of the structure to handle the prepared material, while smaller swinging cranes on some of the columns are used to assist in assembly and loading.

Complete assembly of each of the individual sections is done on a fixed jig or platform at one location. The jigs are built to the proper height for the least fatiguing work and are

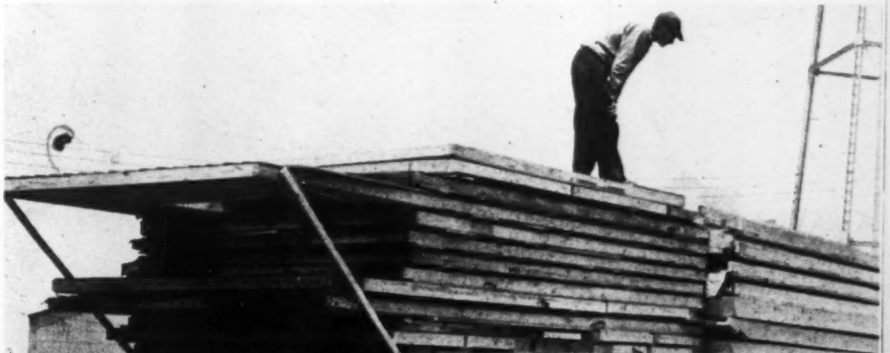


Fig. 3—Loaded semi-trailer truck stops just outside of assembly shed for final check and delivery instructions. Exterior and interior walls are in the rear stack and ceilings are over roof sections placed in front.

marked with vari-colored lines to show the location of parts for different types of buildings. The jigs are arranged to be as nearly mistake-proof as several years of experience can make them. Templates are arranged so that pieces are held firmly in their exact position for fastening other parts to them.

Assembly of sections

The floor of a house is assembled in two sections on a total of eight separate frames. The frames are each about 7x12 ft. with the outside pieces of 2x10-in. lumber and 2x6-in. joists across the 7-ft. dimension resting on a 2x3-in. ledger spiked to the frame. An insulating blanket, 16 in. wide and ½ in. thick, is fastened between each pair of stringers by use of a stapling machine, but no subflooring is used. The best obtainable grade of prefinished oak flooring, 25/32 in. thick by 3¼-in. wide, is laid.

An end-matched feature (tongue-and-groove on the ends as well as the long way of the pieces) makes it possible to allow the joints in the flooring to come at any point, rather than requiring that each piece be sawed to bring the splice over a joist. The flooring is laid over four frames, or half a building, at once to reduce end cutting and waste of the material by more than fifty percent. After the floor is nailed to the four sections of frames it is cut transversely along the joint between the frames by a portable circular saw. Longitudinally, between the frames in the other direction, the sections come apart easily along a joint in the flooring.

Where the bathroom and heater for the house are located, and at the threshold, the hardwood floor is omitted and plywood substituted. This practice saves on the more expensive materials where they add no value to the completed house.

Wall fabrication starts with the studs and pre-assembled window rough-frames laid out to position on the jig. Electrical outlet boxes had been previously attached to the studs and are placed with them into the

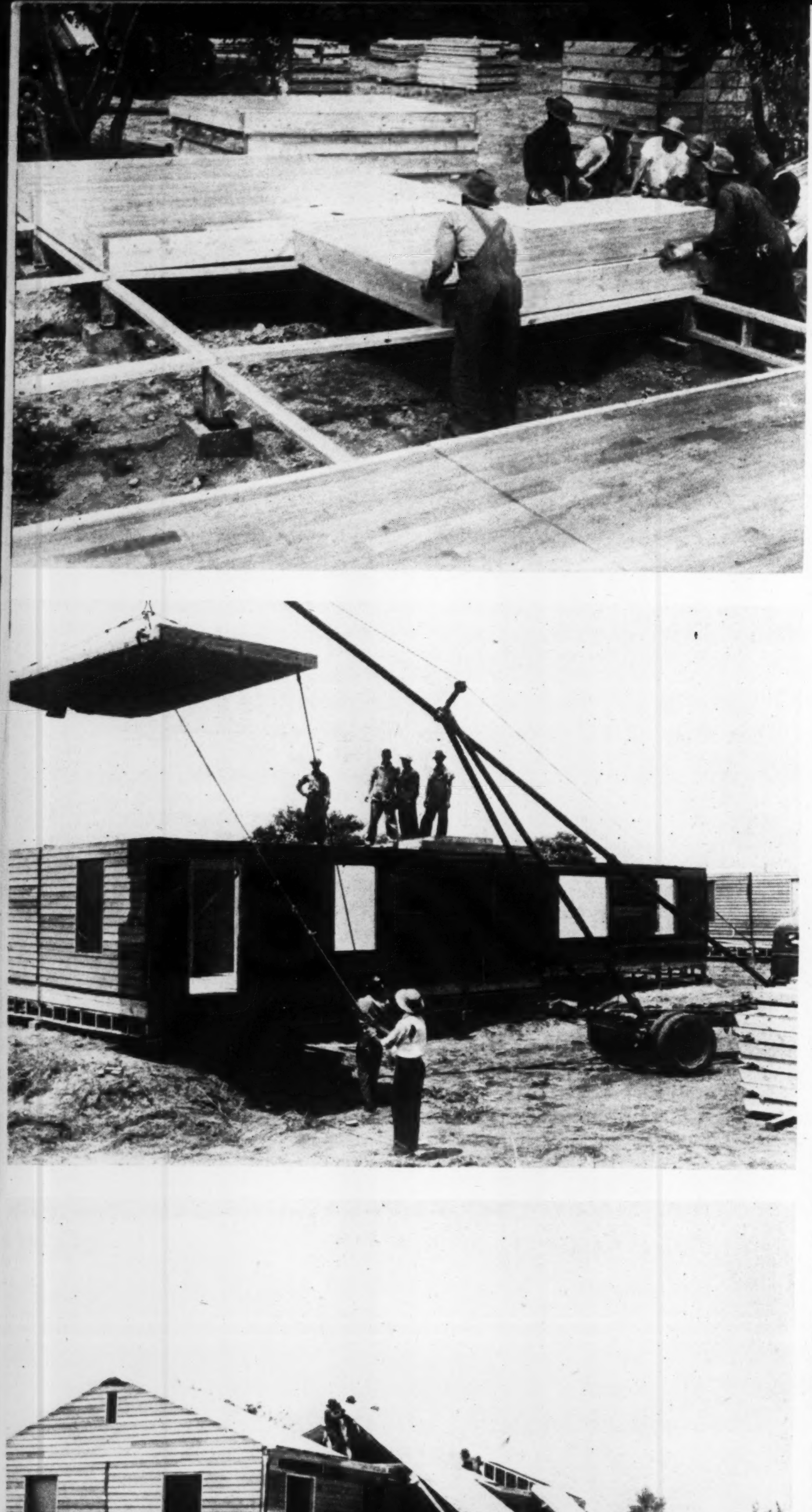


Fig. 4—Only departure from manual handling is lifting of ceiling sections (center) with job-built A-frame rig that uses hoist driven by power take-off of truck. The floor sections (above), heaviest pieces of the house, are placed by hand, while (below) roof sections are pushed up soaped skids to the assembly crew.

proper position with wires drawn through the top wall plate to make them easily accessible. The insulating board is laid over this for the interior wall of the house. First operation is application of a specially prepared glue to the upper edge of the studs by a newly devised applicator that uses a fluted wheel to apply the glue. The previously cut-to-shape board is laid on the studs and fastened down with small nails set to below the surface, primarily to hold the board until the glue sets. The section is immediately turned over and a layer of 30 lb. per square tarpaper placed over the entire wall. Over the tarpaper is laid the redwood weatherboarding of the exterior surface. This is nailed in position and ends are cut to the edge of the frame with a portable circular saw.

Ceiling construction follows the same plan, with the joists laid out in a ceiling jig. Here, however, an insulating blanket is laid between the joists, fastened with wire staples, and over this is placed the insulating board that becomes the finished ceiling of the house. The gable construction is 30-lb. tarpaper and redwood weather-boarding fastened to the stud sections. The roof section is $\frac{5}{16}$ in. thick of unsanded plywood nailed directly on the joists and fabricated in eight sections for manual handling onto the roof of a standard building.

Plumbing also pre-assembled

At another yard, near the location of the finished houses, the plumbing is pre-assembled. All the water piping for a house is located in one wall requiring only two connections each for tub, lavatory and kitchen sink and one to the toilet. The kitchen sink and the water heater are set against the bathroom wall so that one pipe assembly, made up in an open-air shop, accommodates all the rough plumbing in a house. Drains also are close together and installed in one piece.

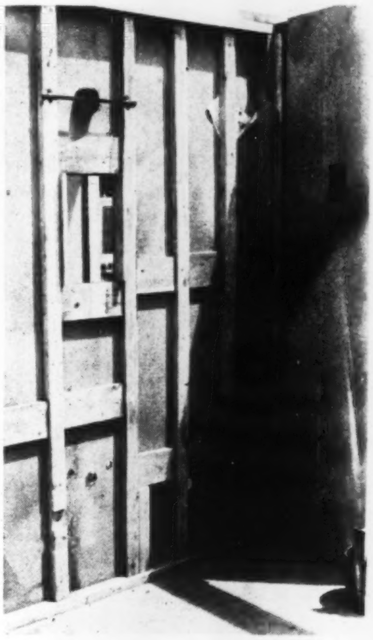


Fig. 5—Bath-kitchen partition is a double wall; after one side is set the plumber is allowed 15 min. to put in his rough piping before the other half of the wall is placed. "Going back for tools" is eliminated by pre-assembly of all pipe.

Doors and windows are purchased completely fabricated and set in their respective frames with hardware and glazing already installed. Even the window frames have hardware attached for the screens, which come to the work ready to hang. Interior trim is purchased ready to use but is cut to the required length at the trim shed and given a priming coat.

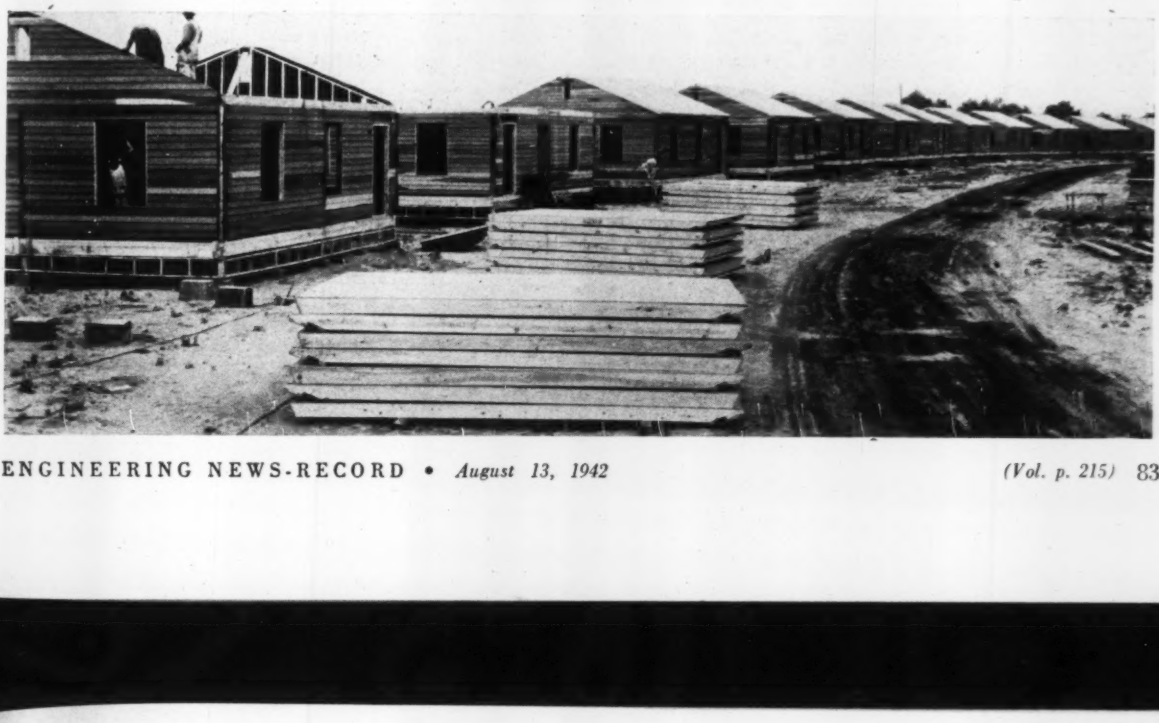
Ten different houses

The houses are built to a standard design but there are variations that require ten different types of fabrication, alike in most respects but differing sufficiently that each house is built for a specific location. The standard house is a completely detached, two-bedroom unit. However, to provide units with one or three bedrooms and still use the basic design, many of the houses are built close together and the bedroom of one unit arranged with its only door opening into the living room of the adjacent house, Fig. 7. The one bedroom is completely cut off from its own house and becomes a part of the other unit. Houses are "staggered" to bring door to a convenient point.

Two complete walls are used between the two houses, just as if they were several feet apart, and the door is framed through the two walls. All parts of the house are constructed exactly as for the standard design except for the extra framing for a door and the rearrangement of the windows. If it becomes desirable later to use the house as a separate two-bedroom unit, it can be remodeled by replacing one of the sheets of insulating board and covering the exterior.

In the detached houses there is a single window in each of the two exterior walls of each room; in the attached type double windows are used in the front and rear to compensate for loss of a window on the unexposed side. "Rights" and "lefts" of the standard plan and specials at

Fig. 6—Row of detached houses. Tar paper and composition shingles will complete the roof. Redwood sheathing will be added for skirt boards to within 6 in. of the ground.



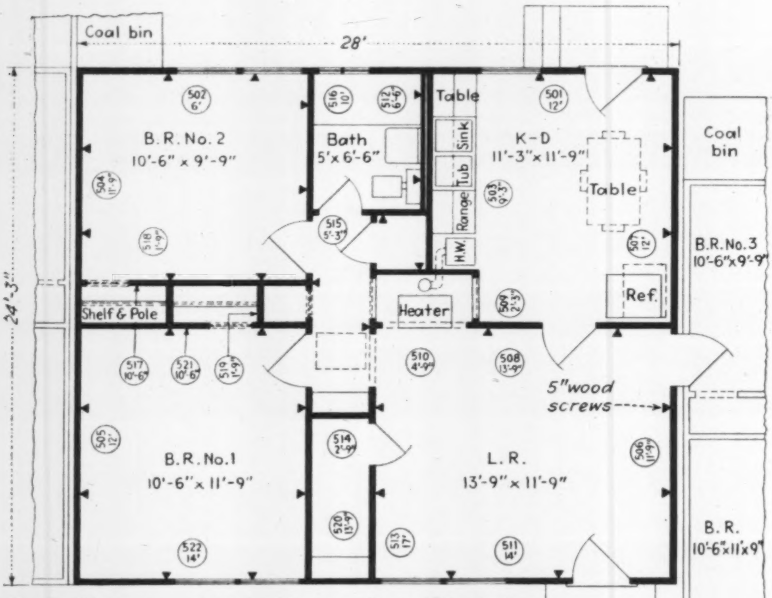


Fig. 7—Floor plan of typical house. One of the bedrooms of the adjacent house is arranged to open only into house shown to make alternate one and three-bedroom units from the basic two-bedroom house.

the ends of rows of houses make up the ten types that are in use.

Each house thus has definite material requirements and is scheduled through the fabrication shop so that it is ready for assembly in the proper sequence to avoid having pre-assembled sections in the field unused and yet have all of it there so crews can progress along an orderly line when erecting. The construction superintendent selects the area in which erection will be done next and from the plot plan of the job takes the number of each house. Fabrication and assembly in the shop is done to order for each individual house.

As the sections are completed the floors for two adjacent houses are loaded on a semi-trailer truck for haul to the housing site. The 22 exterior and interior assembled wall sections for one house are loaded on a trailer with the 13 ceiling and 8 roof sections making a compact load. The gable sections are hauled separately and are the only parts of the building that do not lend themselves to loading for efficient hauls.

Material is loaded at the fabricating plant in such a manner that in assembling the house each piece is reached in its proper sequence for installation. As the trailer-truck leaves the yard it is checked for complete content required and proper destination so the driver knows exactly where to go. At the site the driver finds the house numbers clearly legible and knows from the location of the stake carrying the house number where to spot his truck for unloading. A truck-mounted crane, with special lifting gear to prevent damage to the material, unloads a truck in two lifts.

Foundations are simple

At about the time the materials start through the fabrication shop, the land, generally rather level with little grading necessary, is cleared of brush by a bulldozer. The buildings are staked out, and the 15 footings for each are located and dug out by hand to a depth of 18 in. below final ground level in the area. Concrete is poured to a depth of 6 in. in the unformed footing and after it hardens slightly a 12x12-in. precast concrete pier is set on the footing, plumbed and centered. The piers have a 2x6 creosoted board 8 in. long cast into the top and held by nail anchors to serve as a bearing plate. A steel strap extends from the pier for nailing to the frame to anchor the houses to the foundation. No attempt is made to bring the concrete foundation piers to a level grade, though they are within an inch or two of it from normal care in placing the footing.

Surveyors mark each concrete pier for identification and take a level reading on the creosoted bearing plate. A 4x4-in. post is ordered from the field carpenter shop to bring the foundations to the plan level. The posts are about a foot long but each varies in length and is ordered cut to feet and hundredths to avoid the possibility of error in translating from level notes to fractions of inches. The saw table is equipped with a calibrated scale set to cut each piece to the right length. Pieces are marked with the house number and the pier location for which they are intended.

Fifteen minutes per operation

The several erection operations are so arranged and the crews are of such size that each individual operation requires 15 to 20 minutes each. With one exception all work and lifting is done manually, a small number of electric nut runners, operated from portable generators, being used for connecting the sections. Each crew performs only one part of the work, then moves to the next structure and repeats the same operation. The cycle of erection is described in the sequence in which the work is performed.

Floors—A crew of six laborers sets the eight pieces of a floor together on the completed foundation framing (Fig. 4). The 2x6-in. cross timbers permit sliding the floor sections rather than lifting saving time and effort. A crew of three carpenters assisted by three laborers squares up the sections, matching the flooring between sections and bolting the frames together below the floor. A chain load-binder is used to pull the sections together to make the floor tight. The sawed joint in the floor across the flooring and along the longitudinal center of the house comes under a partition. A tarred, fiber-backed kraft paper is fastened over the floor with stapling machines (the edges are glued also) to protect the finished oak surface from the weather and the workmen.

Walls—The walls and partitions are in sections up to about 17 ft. long and usually are unloaded from the truck near enough to the house in order that they can be skidded onto the floor. Five laborers, three carpenters and a foreman make up the erection crew. The laborers stand the sections up in position, while a carpenter, working from a stepladder, fastens them together at the top with a prepared scab. Each interior partition fits into a prepared position where no insulating board is on a stud so the location is definitely fixed.

All sections are so perfectly fabricated that each slips into its place without forcing or delay. The partition wall between the bath and kitchen is in two sections with the wall board on only one side of each. One section is set and as the assembly of the rest of the house proceeds the plumber is given 15 minutes to install the preassembled piping in the wall. A small crew of carpenters follows the erection, squaring up the walls and connecting them with lag screws turned in with a nut-runner.

Ceilings—The material for the ceilings is lifted to position by a hoist on a power take-off from a truck operating over a pipe A-frame on the rear of the truck (Fig. 4). This is a job-made arrangement and, since it does not swing, the truck must be maneuvered to permit placing where required. The special derrick will reach over the house sufficiently to place the ceiling sections on the opposite side but some tricky maneuvering is required to spot the load where wanted.

Gables—Next on the production line is the erection of the gables. This is done by sliding the pieces part way up the building on skids to a holding block, then the crew, one laborer and three carpenters walk on the ceiling joists to set the gable in position. This crew also trues up and fastens the pieces of the ceiling.

Roof—More than four roofs an hour are set by a crew of four on the ground sliding sections up a skid and two laborers and three carpenters at the ceiling level setting the prepared sections in place. The reason for the rapid work is because of such complete planning and fabrication that every piece drops naturally into position despite the usual complications of a gable roof. Following crews bolt the sections together and to the frame of the house, cover the exposed plywood sheathing with tarpaper quickly to protect it and later lay a 210-lb. per square, mineral-surfaced, colored, asphalt shingle roof.

Accessories—Stoops and a coal bin are provided, being fabricated at the shop and trucked to the site. The piping for the water and sewage lines are brought to 5 ft. outside the buildings as part of the house contract. Redwood skirt siding to within 6 in. of the ground line is put on in the field, the one operation not done by prefabrication.

Trim and Paint—All material for the trim of each individual house, including windows and doors, is assembled at the job trim-shed into two large boxes designed for pickup by the motorized lumber carrier. When requested in the field the boxes are hauled to the site and left loaded until needed, thus assuring the minimum of handling and least danger of scarring. The interior of each house is spray painted one coat before any trim is placed and a second coat of paint is brushed on following completion of the carpenter work. The floors, protected during construction by the fibrous paper cover, need only waxing to make them ready for use. The redwood sheathing is given one spray coat of a cresote stain.

Organization

The $15,000,000 contract for the 5,000 homes is held by Barett & Hilp, San Francisco, for whom I. D. Raffin is project manager and G. V. McKeever is general superintendent. Stanley A. Brown is field superintendent assisted by James Warn, Rube Williams and Ray Nichols.

Design of the houses and the prefabrication layout has been developed by the Homasote Company of Trenton, N. J., who produce the insulating-board, Homasote, which is an essential part of the construction described. F. Vaux Wilson, Jr., vice president, has had general supervision of the project for Homasote. He is assisted by Griffith Clark and a small staff to give the benefit of pre-fabrication experience to the contractor.

The project is being built for the Federal Public Housing Administration for whom J. W. Cardwell and C. E. Winston are in immediate charge.

Alternating Double Filteration Aids Overloaded Sewage Plant

Alternating double filtration of sewage has been applied with marked success in handling excessive loads at the Minworth plant of the Birmingham, Tame and Rea District Drainage Board in England, according to the 1941 annual report issued recently.

This process, says the report, originated from observations made by the board's engineer, H. C. Whitehead, and the late chemist, F. R. O'Shaughnessy, and first was tried out on a large scale for the purification of waste water from the milk industry. The success of the experiments with these wastes solved what was hitherto a difficult problem.

Collaboration between the Water Pollution Research Board and the Drainage Board resulted in a trial of the new process on a large scale at the Minworth plant, where the industrial sewage of Birmingham is treated. A portion of the plant was set aside to compare treatment of well-settled sewage by single filtration, with treatment through two alternating filters.

In the alternating system, sewage is distributed onto one filter, and the effluent, known as the primary effluent, is passed through a secondary tank to remove suspended matter. It is then pumped onto the second filter and again settled after filtration before being discharged as effluent. Periodically (every week, for instance) the order of filtration is reversed. The second filter then receives sewage while the first filter receives the primary effluent. (See *ENR* Feb. 26, 1942, p. 342).

These experiments have continued since 1938. They have shown conclusively that while each cubic yard of medium in the second filter can purify 60 gal. of Minworth sewage per 24 hours in winter, and 80 gal. in summer, each cubic yard of medium in the alternating double filter can purify at least 160 gal. per 24 hours, winter and summer. Even this high rate of treatment does not seem to represent the maximum rate of operation of the alternating double filtration plant, says the report.

Filters operated by this new process are said to become more efficient because the growth and deposits that form on the filters receiving the sewage are partly removed when the filter is treated with primary effluent.

The experiments have fully justified their continuance at a time when work of this nature ordinarily would cease. The new process concludes the report, has been applied with marked success to the solution of wartime problems.

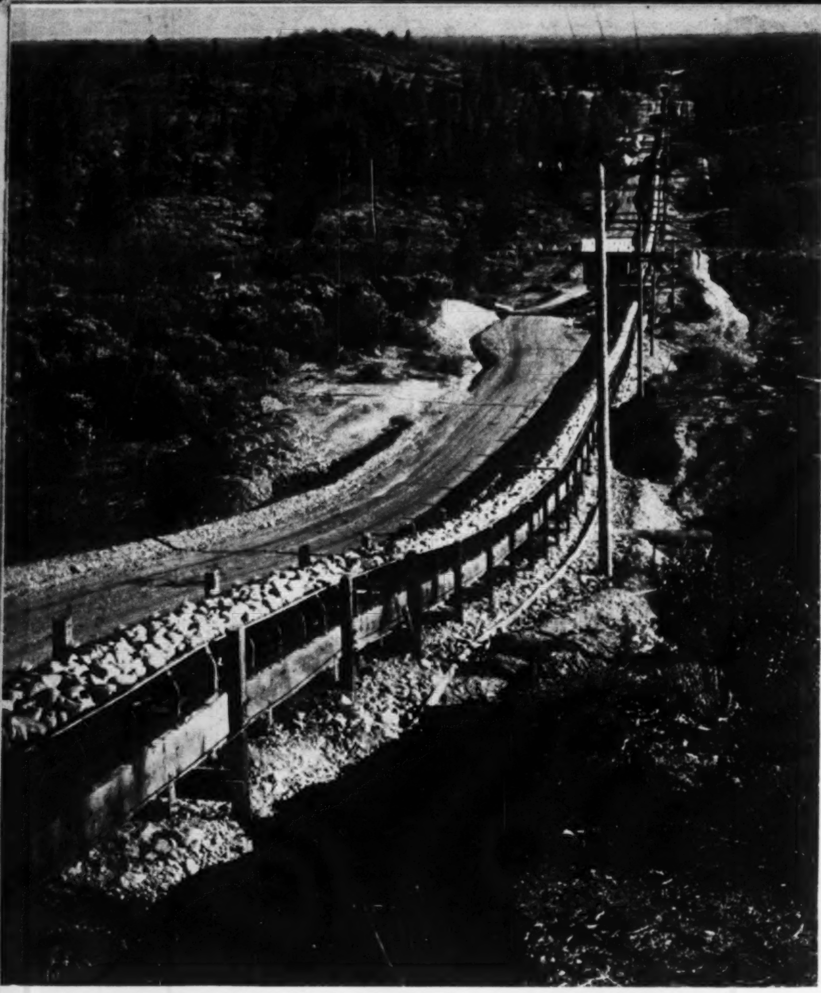


Fig. 1. A full load of cobbles nearing end of 9.6 mile belt conveyor journey to Shasta Dam. Average delivery rate 1,000 tons per hour.

Operating A 9-Mile Belt Conveyor

A. H. Whitmore
Assistant Engineer, U. S. Bureau of Reclamation
Redding, Calif.

***Contents in Brief**—The 26-flight belt conveying sand and aggregate for Shasta Dam from the gravel pit at Redding, Calif., delivers an average of 1,000 tons per hour; belt wear is slight and does not vary with slope; difficulties caused by rain and impact have been overcome; silt loss in transit exceeds fines made by grinding at transfer points.*

ALMOST 6,000,000 TONS of aggregates have been delivered in nearly two years of successful operation by the 9.6-mile belt conveyor system that serves Shasta Dam. The 26 flights that constitute the system extend from the processing plant at Redding to the Shasta Dam receiving hoppers at Coram, and are operated by the Columbia Construction Co., Inc., which also operates the processing plant. (A description of the belt appeared in *ENR*, July 18, 1940, p. 103.) Another connecting conveyor system of 14 flights carries the aggregate an additional 1.2 miles from the Coram hoppers to the mixing plant at the dam. This second system is operated by Pacific Constructors, Inc., general contractor on Shasta Dam.

Sand and four sizes of gravel, up to a 6-in. maximum, have been transported over the Redding-Coram belt system at an average rate of 1,000 tons per hour of actual operating time. Columbia officials have established a maximum load limit of 1,400 tons per hour. Depending upon the demand at Shasta Dam for aggregates, the conveyor belt has been in operation for six to twelve eight-hour shifts per week. Operation is normally confined to two shifts per day, but on one or two occasions a single third daily shift has been necessary.

No major changes in the belt system have been required although many minor additions and adjustments have been made to minimize maintenance and to simplify operation. For example, after several months of experimentation with different types of transfer chutes, it was decided to use a single pattern consisting essentially of a deflector to reduce the velocity of the aggregate as it is taken from the head pulley, and a chute to lower the aggregate stream onto the succeeding belt. This chute is similar to one developed by the contractor at Grand Coulee Dam.

Installations in each of the 26 flights are identical except for the lengths of the various chutes. In each case, the vertical distance between the head pulley of one belt and the tail pulley of the following belt is the same, but a variation in chute lengths is necessary because of the vertical intersecting angles between the belts. At certain stations where an uphill flight joins a descending one, a longer chute must necessarily be employed. The transfers have operated in a very satisfactory manner except for the four longest chutes where rapid wear has necessitated frequent repairs or replacements.

As a whole, the wear on the belt has been surprisingly little and apparently quite uniform regardless of the slope of the flight. As might be expected, it is somewhat greater on the shorter flights. No belt replacements have been required as the re-

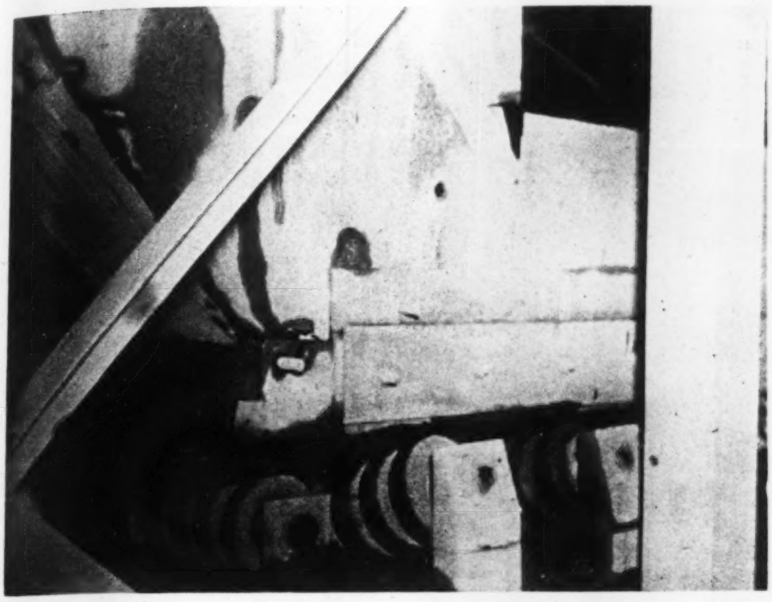


Fig. 2. Pneumatic troughing rollers at transfer points, mounted under the belt, absorb impact. Each roller is made up of twelve wheels with 8 by 2.50 tires.

sult of wear and none are anticipated. Several serious cuts have required splicing-in of several sections of belting, one as long as 2,000 ft. Tramp iron and plugged chutes were the sources of most of these cuts.

Columbia Construction Co., Inc., developed and installed several unique protective devices that have eliminated this type of accident almost completely. A magnetic iron detector at the gravel plant will stop the belt when a piece of iron or steel passes through the mechanism. At each transfer, an automatic device shuts off the belt when an overload builds up in the transfer chute. Two rows of especially designed troughing rollers are used under each transfer chute to absorb the impact. Each roller is made up of twelve wheels with 8 by 2.50 pneumatic tires.

Soon after operation began, it was found that with no roof over the belt, even a light shower would cause the downhill belts to slip on the tail pulleys and run away. Similarly, on the uphill flights the belt would slip sufficiently on wet drive pulleys to allow rock to pile up and plug the chute at the preceding transfer. These tendencies to slippage were corrected by attaching lagging, with a roughened surface, to the drive pulleys. This expedient made it possible to operate without slippage even during the heaviest rains.

An attempt to operate the system while the belt was covered with a 3 in. blanket of wet snow resulted in complete failure. At each head pulley, the discharged gravel and snow rolled up into large balls that completely plugged the transfers. Probably nothing will be done toward solving this problem, as heavy snows occur very seldom in this locality.

Until preventive means were employed, some of the fines adhered to the return belt and were carried back to drop off and gradually build up accumulations around the rollers causing undue wear in bearings. A wiper and a set of sprays installed at each transfer afforded a practical solution of this difficulty. A drip chute under the wiper carries most of the fines and washwater to the following flight.

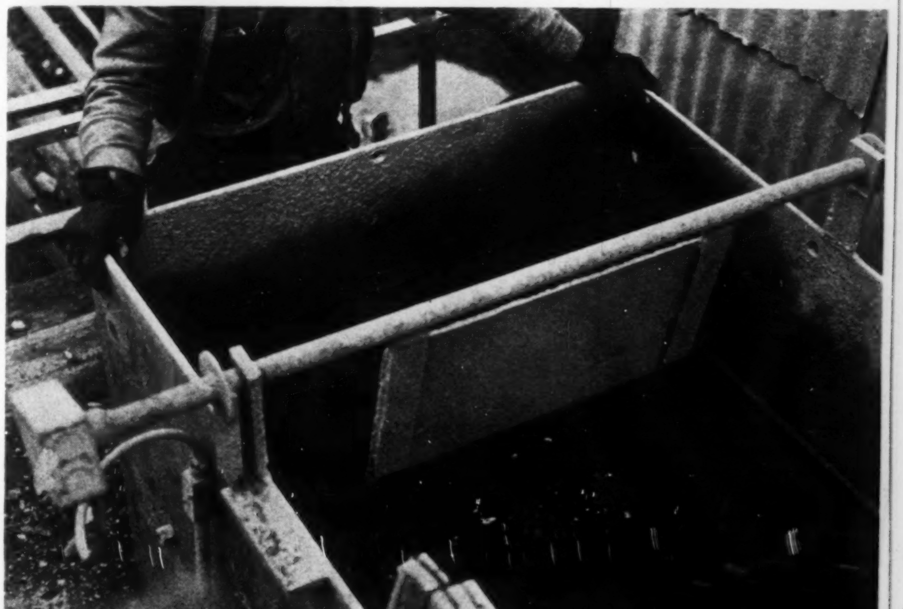
Despite wipers and sprays, some fines are carried back with the return belts and gradually form sizeable deposits under the conveyor. The size of these deposits is increased somewhat by spillage from the loaded belts. This waste material is periodically removed with a small tractor, or, where limited clearance prevents the use of the tractor, by sluicing with a hose.

Starting the conveyor in cold weather can result in severe damage because the belt freezes to the pulleys and rollers, and the gravel freezes to the belt. However, while the belt continued operation, the temperature has dropped to 10 deg. F. below freezing without causing trouble. Operation when the temperature remains just at freezing causes difficulties, as fine particles of ice build up on the pulleys and rollers. Several "runaways" of downhill flights have been attributed to this cause.

When freezes occurred during the night, the belt was not started until the ice had thawed out. There is not much low-temperature weather in this locality and winter-time progress of the work is slow enough so that constant operation of the belt is not required.

Silt tests furnish the only data on the grinding of aggregates due to belt transportation. Silt content at the delivery end of the belt varies from 0.2 percent on cobbles to 0.5 percent on fine gravel. The silt content on

Fig. 3. An overload on the belt deflects the plate and stops the belt by actuating cutoff switch at left end of rod.



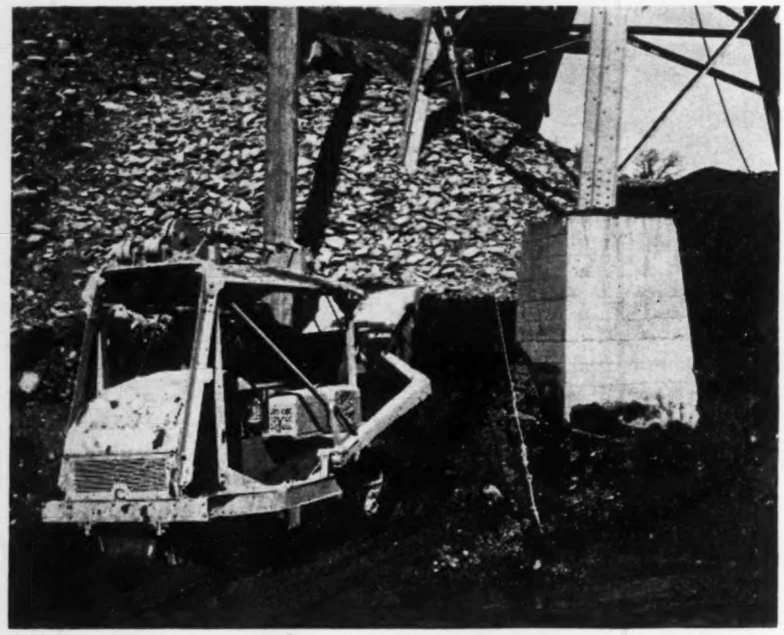


Fig. 4. Spillage under the belt is removed periodically by a small tractor with an overhead bucket loader. A bulldozer attachment is used where material can be pushed over a bank for disposal.

gravel at the processing plant is negligible. The difference between the silt percentages at the plant and at the point of delivery has averaged about 0.6 percent for sand. This silt or rock dust apparently has caused no serious difficulty in the concrete, but was the cause of a very disagreeable dust condition at points of transfer and unloading until water sprays were installed at intervals along the conveyor. Even with the added silt, the fineness modulus of the sand is consistently higher at the end of the belt trip than at the start; the probable reason is that some of the fine material sticks to the return belt and is lost.

Routine screen analyses of aggregates taken at each end of the conveyor show that some chipping and breakage occur in transit. Only that portion of breakage reflected through increase in undersize between the gravel plant and Coram is revealed in these tests. For the cobbles and coarse gravel, a difference of 3 percent between the processing plant and Coram is average. The increase in undersize in the two smaller sizes of gravel is negligible.

An attempt at rescreening in the processing plant, which materially reduced delivery to the belt, led to an interesting discovery. Reduced volume increased breakage. Reducing the belt load by 50 percent increased (in transit) the amount of undersize material by about 8 percent.

Conveyor operation now requires seven men and one foreman per shift. The man at Coram operates the controls for the entire conveyor. Another operator at the processing plant loads the aggregates onto the belt. The 26 flights are divided between three oilers, whose duties are to oil the motors and driving mechanisms and to keep the waste deposits washed down. Each oiler is provided with a car with which to patrol his section of the conveyor over the road that follows the belt closely for its entire length. Necessary repairs are reported by the patroling oilers and, if they require immediate attention, are taken care of by a mechanic and helper. A six-man maintenance crew takes care of the routine repair work when the conveyor is shut down. Greasing of rollers is done by two men who cover about one flight per day.

Radio communication abandoned

The two-way radio system originally installed for communication between conveyor workmen was abandoned. Federal requirements made it necessary for all workers using the system to have licenses and to keep a complete log on each conversation. Columbia officials did not believe that the radio's usefulness justified meeting these requirements.

Communication between conveyor workmen is now handled entirely by telephone, with an instrument at each transfer station. Loud horns at the stations sound the call signals along the entire conveyor system whenever a call button in any of the telephone locations is pressed.

Personnel

The Redding-Coram conveyor is owned and operated by Columbia Construction Co., Inc., of Oakland, Calif., of which Henry J. Kaiser is the president and W. A. Beach is superintendent in direct charge of operation. Shasta Dam, a part of the Central Valley Project in California, is being constructed under the supervision of the Bureau of Reclamation, John C. Page, commissioner. S. O. Harper, chief engineer, and Ralph Lowry, construction engineer. Aggregate production and concrete control are under the direction of W. D. Wood.

Baltimore Difficulties With Sludge Cake Disposal

A sludge disposal problem at Baltimore, Md., which has been developing since the inauguration of the dewatering of digested sludge by vacuum filtration, is becoming more acute, according to the annual report (1941) of the Maryland State Department of Health. The sludge cake, which is not entirely acceptable to farmers because of its sticky condition, is being deposited over the plant area as a temporary expedient.

Several complaints have arisen alleging odors from accumulations of this dewatered digested sludge. Upon investigation, however, it appeared that these allegations could not be substantiated except in the case where some of the material which had dried out caught fire and smoldered for several days. As a result, objectionable odors were noticed adjacent to the plant area.

Plans have been prepared for installing sludge drying equipment, the dried material to be sold to local fertilizer companies. It is anticipated that profit will be derived from the sale of the dried sludge sufficient to pay for the equipment within a period of from four to five years. At the present time an average of 1,000 tons of sludge, on the dry solids basis, are being produced each month.

Permanent Lane Markers at Canton

John A. Shisler
City Engineer, Canton, Ohio

TRAFFIC HAS INCREASED greatly on the streets of Canton during recent years and large sums of money have been spent on construction and maintenance of the thoroughfares to provide for its safe movement. Where large volumes of normally slow-moving traffic are concentrated, it is necessary to provide every facility for free movement of traffic and to utilize fully the areas available for that purpose.

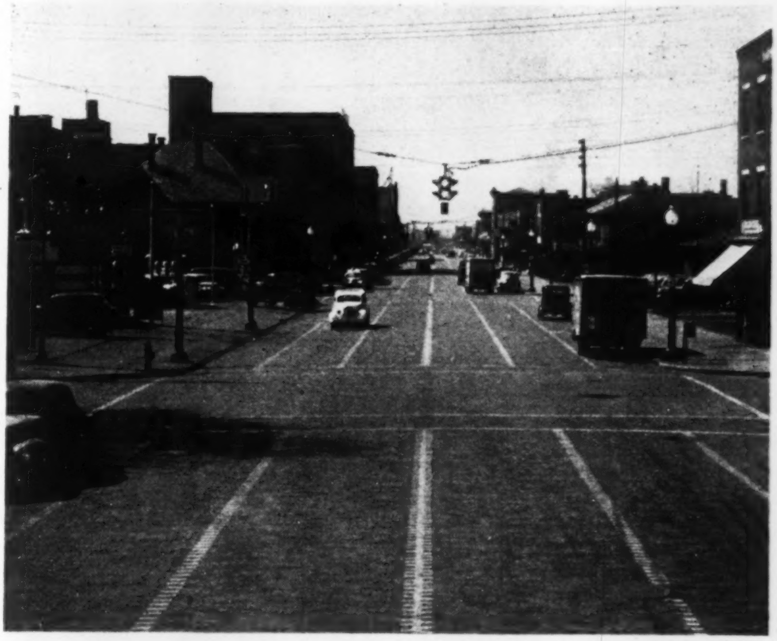
A good example of how that is being done is found on Cherry Ave., N.E., where the old brick pavement was relaid during 1941 from Tuscarawas St., East, to Lawrence Road, N.E., a distance of 2,600 ft. The street is paved 50 ft. wide between curbs. Its old pavement had become somewhat rough due to the fact that it was laid originally with a lugless brick which prevented proper penetration of the asphalt filler and allowed water to penetrate the joints into the slag cushion, which in turn caused the slag cushion to become hard and uneven. This street carries the maximum of heavy-duty traffic in a warehouse and semi-industrial area. When it was decided to relay the brick it was deemed advisable to place permanent buff brick traffic markers to designate the traffic lanes and parking areas as an aid in keeping this traffic moving in clearly defined lanes.

In repaving Cherry Ave., the 3½-in. lugless brick were cleaned and relaid on a sand-oil cushion, using a removable ⅜-in. metal spacing-strip between the brick to obtain a joint that would allow the proper penetration of the asphalt filler.

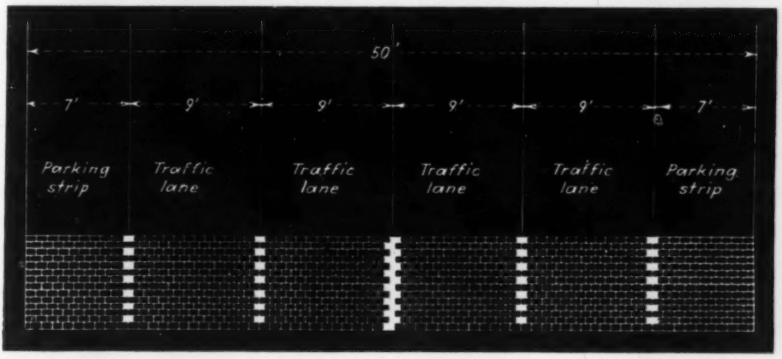
The street was divided into four main traffic lanes, each 9 ft. in width, with parking strips 7 ft. in width adjacent to each curb. The center marker strip is a solid line of marker brick formed by the overlap of two lines of the buff-colored brick, while the intermediate marker strips are formed by laying a buff-colored brick in every other row of bricks. Heretofore, traffic lanes had to be painted at least once, and sometimes twice, each year, for the proper distinction of the lanes, while the new traffic lane markers are permanent and good for the life of the pavement. This is expected to produce a considerable saving and to reduce traffic problems, because the lanes are always discernible.

The marker brick used are a light buff color, a wire-cut lug pattern with a smooth surface for reflection of light. This smooth surface also keeps the bricks from becoming dirty. The motor vehicle users of this city are enthusiastic over this method of marking traffic lanes.

The marker bricks are subject to the same A.S.T.M. tests as other paving brick. They were furnished by The Metropolitan Paving Brick Co. of Canton, Ohio.



Two parking lanes, four traffic lanes and crosswalks are permanently marked in this section of Cherry Ave., Canton, with buff-colored brick set in the pavement.



Method of placing colored brick in the pavement to mark traffic and parking lanes.

Drainage for an Airplane Repair Depot

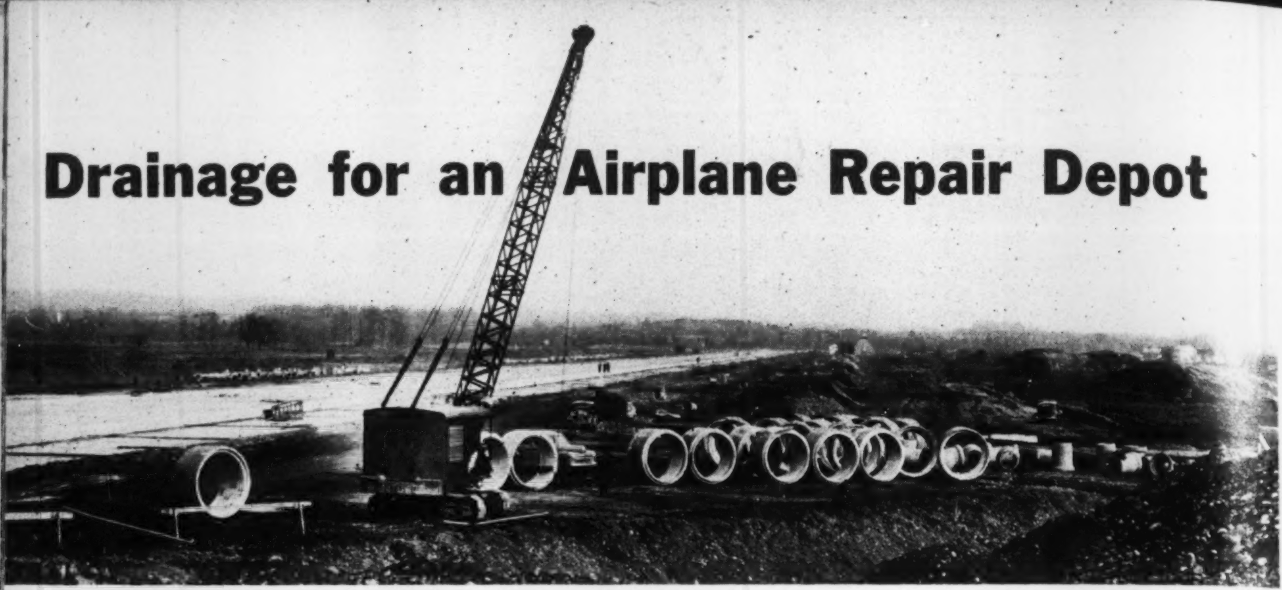


Fig. 1. All flows from the runway and apron areas are concentrated by a 72-in. outfall of 274-cfs. maximum capacity.

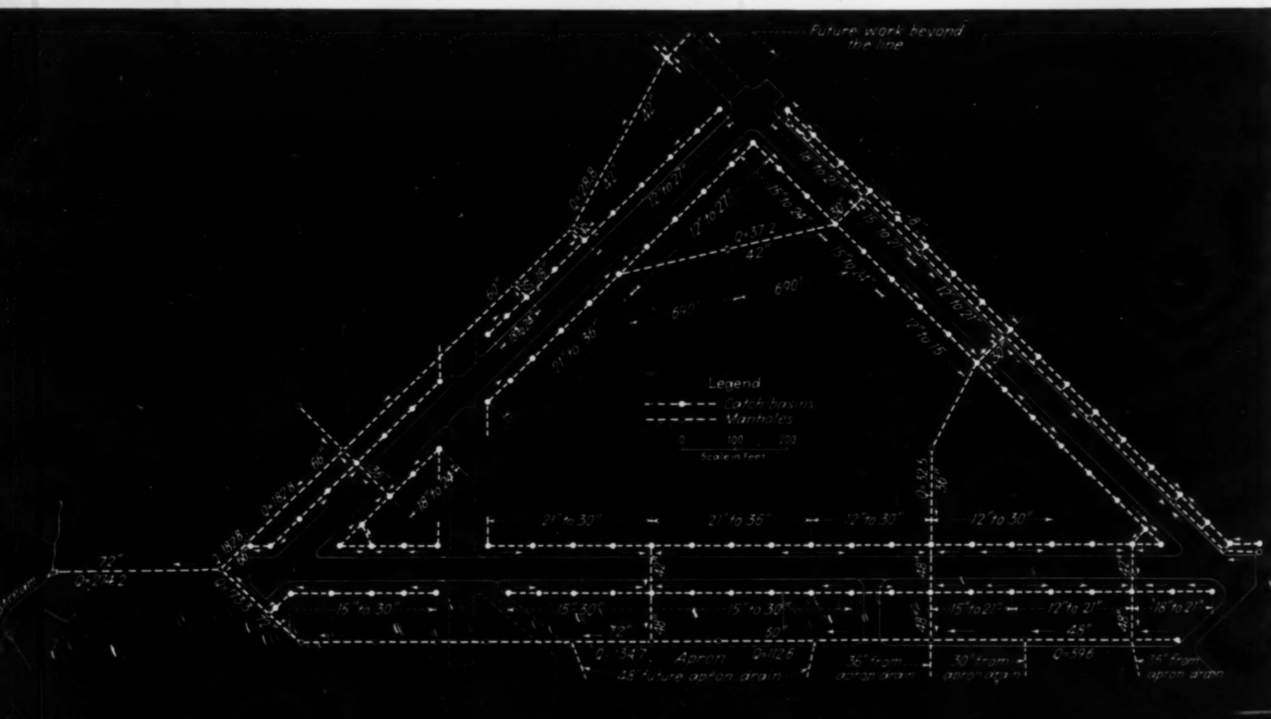
Contents in Brief—*Installation of drainage facilities was an important part of the work in building an eastern airbase for repair of army bombers. This was accomplished by use of 53,850 ft. of 8 to 72-in. diameter reinforced-concrete pipe. Flow from this network is concentrated in one 72-in. diameter outfall. Open joints are used for the lines paralleling the runways and coarse gravel is employed as backfill. Catchbasins on about 200-ft. centers also are required along these lines.*

To Provide Drainage for a 425-acre airfield for an airplane repair depot in the eastern part of the nation, 53,850 lin. ft. of reinforced-concrete pipe was used. The field is located in a relatively flat area where the predominating soil is a loam containing a high percentage of sand and gravel with but few boulders over 12 in. in diameter. Three 150-ft. wide runways, varying in length from 4,500 to 6,300 ft., are available and along with the pavement's aprons and taxiways a total of 437,300 sq. yd. is paved. This means that about 20 percent of the 425-acre field is surfaced.

The pipe required varies in diameter from 8 in. to 72 in., the thickness from 2 in. to 7 in., and the reinforcing from 0.07 sq. in. to 0.47 sq. in. per lin. ft. of pipe. All pipe of 48-in. diameter and over has tongue and groove joints, while those for the smaller sizes are bell and spigot construction. With the latter type the lower 90 deg. of the joints are closed with jute and a 1 to 1 sand-cement mortar.

The general plan followed in draining the field was to use an interceptor drain along each side of all runways (Fig. 2), and then interconnecting mains as necessary to concentrate the flow at the field's western side for disposal through a 72 in. outfall leading to a small stream. This plan meant that 46,000 ft. of the pipe were required for draining the runway area alone.

Fig. 2. Drainage system consists of a drain 75 ft. from each side of the runways and sufficient connecting mains to concentrate the flows at a 72-in. outfall. A few typical pipe sizes and their expected maximum discharges are shown.



Future work beyond the line
Legend
Catch basins
Manholes
0 100 200
Scale in Feet
Stream
72"
Q=274.2
Q=173.3
Q=182.8
66"
60"
42"
Q=28.8
12" to 21"
18" to 24"
21" to 36"
18" to 24"
36"
Q=37.2
42"
690'
18" to 21"
15" to 24"
15" to 21"
12" to 15"
30"
Q=32.5
36"
21" to 30"
21" to 36"
12" to 30"
12" to 30"
15" to 30"
15" to 30"
15" to 21"
12" to 21"
18" to 21"
72"
48"
60"
42"
Q=134.7
Apron
Q=112.6
Q=59.6
48" future apron drain
36" from apron drain
30" from apron drain
36" from apron drain

The interceptors paralleling the runways are placed about 75 ft. from the edge of the pavement and this pipe varies from 8 in. to 30 in. in size. For backfill around the drains, gravel of 2-in. diameter and larger is used. Open joints are employed, as are catchbasins at from 200-ft. to 250-ft. intervals. Thus, the lines carry away both surface and underground flows. The average cut necessary for this piping was 6 to 10 ft. Slope of the lines vary from 0.06 to 0.36 percent and the design velocities between 1.3 and 9.7 ft. per sec.

For the interconnecting mains the average cut was 25 ft. and varied between 12 and 35 ft. Backfill here consisted of the excavated material and closed joints were used. Manholes on about 400-ft. centers were required; because of the depth of much of this work about one-half of the manholes were extra strong.

Construction procedure

Excavation for the drainage system, which totaled 290,000 cu. yd., was accomplished with two 42-in. wide trenchers and seven draglines varying in capacity from 1 to 1½ cu. yd. Trench side slopes of 10 on 1 were possible and the bottom of the trenches for all 36-in. dia. pipe and larger was shaped to fit the lower 90 deg. of the pipe. Trouble from water was not serious, and ten small pumps were sufficient for the entire job, as little water was encountered with ditches less than 15 ft. in depth.

The pipe was delivered in 4-ft. sections and lowered into place by two 1½-cu. yd. truck cranes and one ¾-yd. crawler crane, all equipped with 40-ft. booms. Concrete for the manholes was delivered as transit mix, but that for the joints was mixed by hand at the site where needed.

For the backfilling around drains parallel to the runways the gravel was delivered by truck, dumped along the edge of cut, and allowed to slide down the slope. The material was tamped by hand to a depth of 2 ft. over the pipe, but from there on it was compacted in 1-ft. layers with sheepsfoot rollers. Backfill for the other piping, which was the excavated material, was delivered to the trenches by about ten bulldozers. It was compacted in much the same way as with the parallel drains.

An average of 150 men were employed on the drainage work and this operation took about four months.

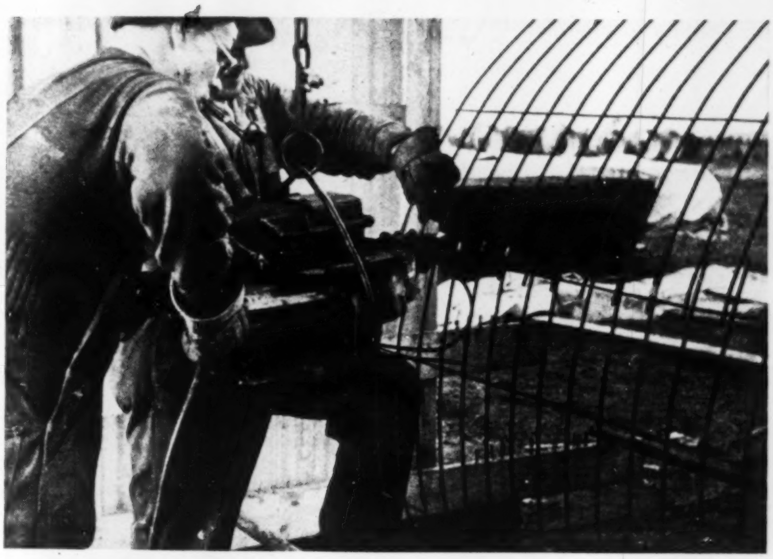


Fig. 3. Much of the concrete pipe was manufactured in 4-ft. sections near the site and all of it was reinforced. Photograph above illustrates a rapid method of welding the reinforcing cages for a section of large diameter.

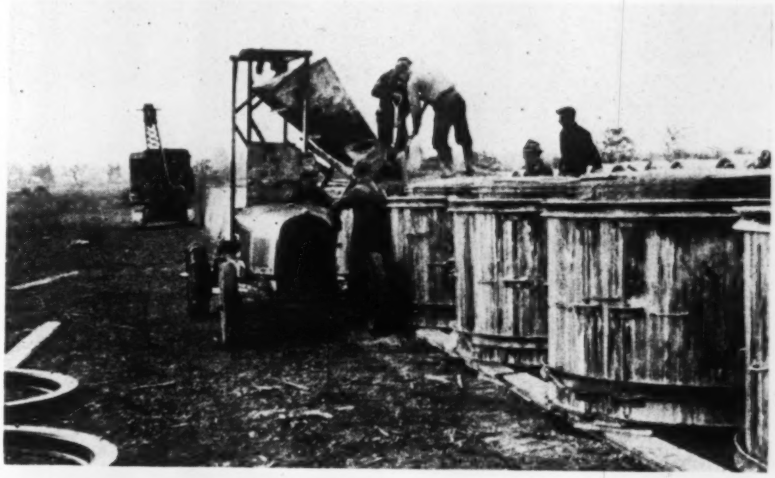


Fig. 4. Placing concrete for the large amount of pipe that had to be manufactured for the project was expedited greatly by this handy dump truck.

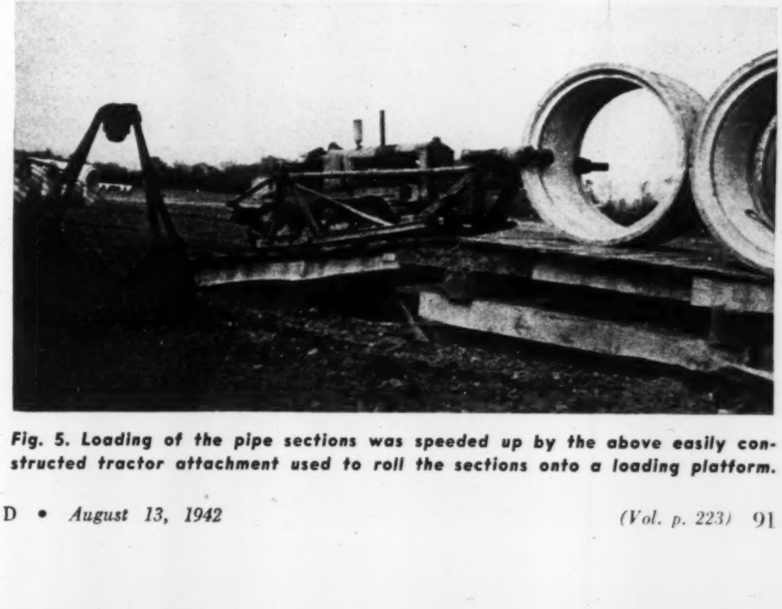
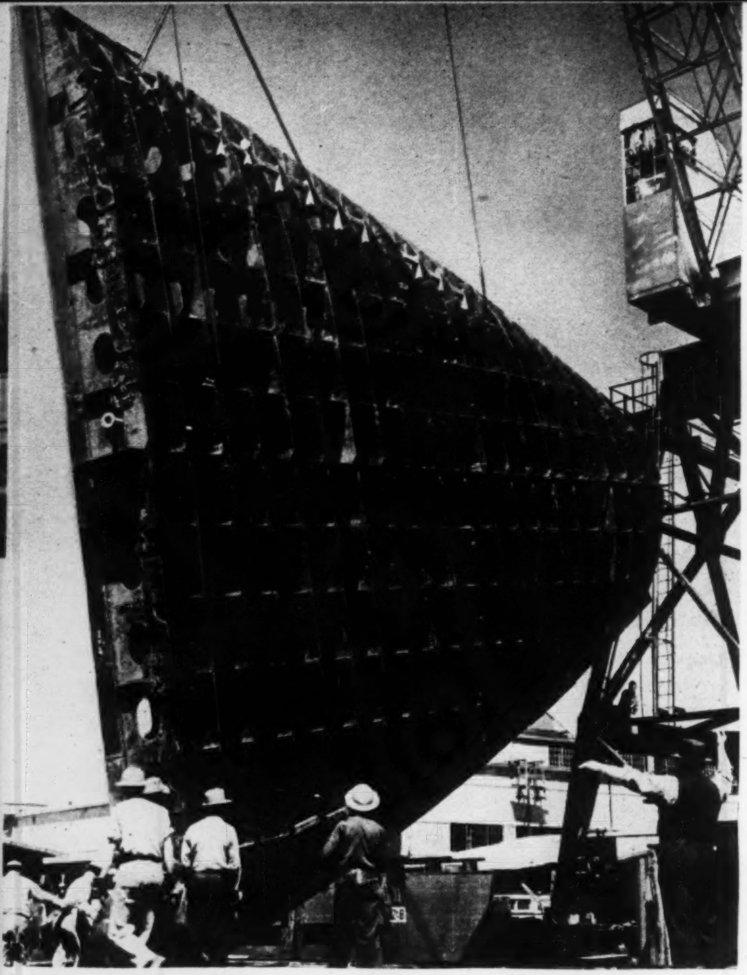


Fig. 5. Loading of the pipe sections was speeded up by the above easily constructed tractor attachment used to roll the sections onto a loading platform.



An inner bottom section being handled by a big gantry crane located between the ways. These sections weigh up to 42 tons

70-Ton Pre-Assemblies Used to Speed Ship Construction

Contents in Brief—*Two yards of one of Henry J. Kaiser's shipbuilding companies on the West Coast, use a multiple support in handling sections of deckhouses weighing as much as 70 tons, mark and inventory pipe items in engine room mock-up, assemble forepeaks, in 59-ton sections, and turn out EC-2s (as of June 25) with 485,000 man-hours.*

TYPICAL OF SHIPYARD PROBLEMS and high-grade performance under the present urgent demands for speed in ship construction, are two yards on the West Coast now producing the Maritime Commission's EC-2 vessels under contracts with companies controlled by Henry J. Kaiser. In these yards, as in others, it has been necessary to discover improvements by experiment and to work out the best practices at the same time that ship building operations are proceeding. There is no foreknowledge of new requirements and new opportunities that constantly arise as ways and means for greater speed are developed and applied.

When these yards were laid out, relatively little pre-fabrication was being done and no one could foresee how much it would increase. Despite a generous space allowance, rearrangement of the yards later became necessary when more and more pre-fabrication was undertaken. These changes were made willingly because the more pre-fabrication the more speed, and there is no substitute for more and more space in shop and yard as pre-fabrication increases. Every advance permitting the assembly of larger units before they are lifted to place on the hull has cut down the time on the launching ways.

These two shipyards have had much the same expansion problems and have somewhat the same general plan layout as another yard under the same management described in *Engineering News-Record*, July 16, 1942, p. 85. There are differences, naturally, in details of operation one reason being that these yards did the pioneering on large pre-assembly methods. Some of the more outstanding practices along these lines are summarized in the following:

Engine room mock-up

Much time is saved, for example, by the complete pre-assembly of intricate piping systems for the engine room. To facilitate this operation a mock engine room is set up in the yard (see illustration on page 95) where there is plenty of space to work. Here piping systems for fuel oil, salt water, bilge and ballast are fitted and bolted up. Most of these systems, consisting of pipes 6 in. in diameter (or thereabouts), are put together in short sections with flanged, bolted joints. This assembly area, or "engine mock-up," has a central wooden dummy the same size as the engine, which all pipes must clear. Dummy flanges are permanently attached to frames or bulkheads marking the start and the finish of pipe systems to be assembled. Thus, pipes can be actually bolted up to the dummy flanges just as they will be, later, in the hold of the vessel.

The floor of the engine mock-up is a timber platform raised about 18 in. above yard level. Its plank flooring is surfaced with sheet iron on which various markings are laid off and to which are welded the "hangers" necessary to support piping at a distance above floor level sufficient for flange clearance. Attached to this floor are all the bulkheads, steel columns, braces or other obstructions which the piping systems must clear when they go into the hull. However, none of these extend up more than 2 or 3 ft. from the floor, thus marking necessary clearances while presenting minimum interference with the temporary assembly.

Pipes come to the engine mock-up bent to the exact shape required but not cut to length, nor are the flanges attached. The first operation, therefore, is to place each section of pipe in the exact position it is to occupy and there to mark it for length. The section is then moved to one corner of the platform where workmen, screened by portable shields, cut it to the indicated length and bevel the edges if end welds are required. While the pipe is thus being prepared, the flanges are also put on both ends.

However, a complete welding job is done only on one flange; the flange on the opposite end is merely tack-welded in place. This is because it has been found that despite conformity to exact dimensions in the engine mock-up, the pipes do not always fit exactly in the engine room. This may be because the ship bulkhead has moved or warped slightly or because of some other minor disalignment. Thus there may be advantage in being able to make adjustment of exact pipe length in final assembly.

Speed in attaching the flanges by welding has been increased with a device that expands a collapsible mandrel against the inside of the pipe, thus providing a bearing and a perfect centering for the flange, which is held in exact position while the tack-welding is done. This avoids danger of tilting the flanges which could easily result from the spot welding if the flange were not held firmly at right angles to the center line.

Pipe sections from the bending shop are delivered alongside the engine mock-up and are assembled without the aid of cranes or other power equipment. A crew of seven or eight men is required for handling the largest pieces. In addition to these porters, the mock-up crew includes sixteen men assigned to pipes for fuel oil, bilge and ballast, and eight others who work on the salt water piping systems. There are also six welders and two burners. Each crew performs the same operation repeatedly, thus becoming specialists in the requirements and making possible a high degree of accuracy and uniformity.

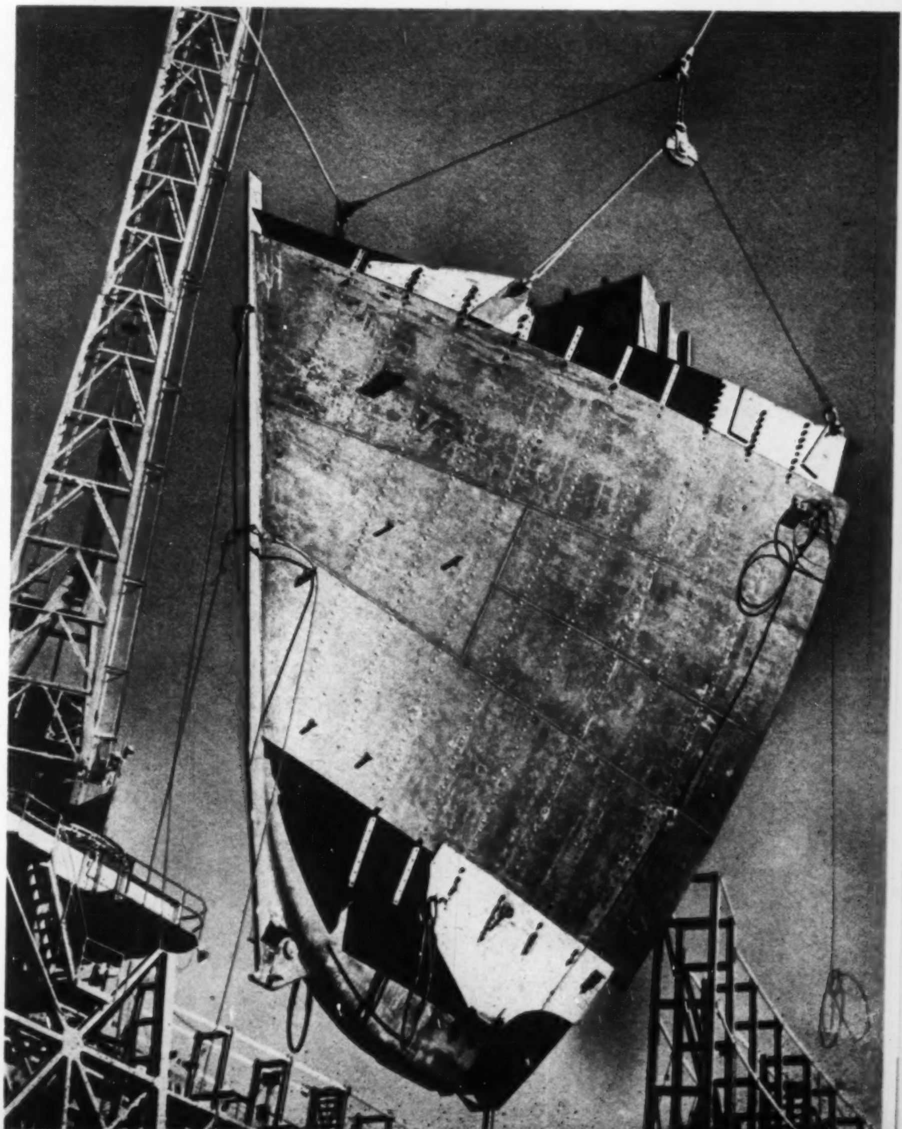
When a piping system is completely bolted up in place, each individual piece is given four designating marks put on with red paint. These include the number of the hull to which it goes, the number of the piece and a mark at each end to insure that the piece will not be reversed (end for end) when assembled on the ship. The end marks are either "for'd" and "aft" or "st'bd" and "port."

When each assembly on the engine mock-up has been completed and is being dismantled for shipment to the hull, the pieces are checked off on a list. For EC-2 engine room piping systems this list includes about 100 items. This inventory list, in duplicate, goes with the consignment to the hull where the leaderman on the installation crew signs a receipt. Since this inventory and receipting system has been adopted, there have been few pieces lost or misplaced in the hulls.

Large assemblies

In the plate shop at Yard No. 2, material-working bays come in at right angles to a long assembly area. This layout, originally planned for six ways, became somewhat congested when the shipyard capacity was substantially expanded, and a new assembly shop is now under way. Meantime, in each of the bays, overhead cranes of about 5-ton capacity deliver to the assembly area under an overhead crane of 65-ft. span and 10-ton capacity. Much pre-assembly is done under these larger cranes. They can either carry completed parts out on an extension of their tracks beyond the end of the shop, or load them on

Forepeaks weighing up to about 60 tons are set in place bodily at this yard.



trailers that deliver direct to the revolving gantries on the ways.

Assembly not done in this shop can be carried on in the areas equipped for this purpose immediately inshore from the ways. Here welding floors are sheltered by movable sun- and weather shields. Although several shield designs are used, all on wheels, the one preferred is a steel frame 60x75 ft. in plan, with a timber roof structure overlaid by canvas.

In these outdoor assembly areas are put together, among other items, sections of the ship sides, completely riveted to the ship channels, with longitudinal welds completed between adjoining plates. Everything on these sections is fastened in place so that when the section goes into the hull, no more work is required except around the perimeter where connection is made to adjoining hull members. These side sections are now made up in sizes of about 27x50 ft. With $\frac{5}{8}$-in. plate thickness, they weigh about 30 tons each. When the hull is ready, one of these sections is picked up by two of the gantry cranes and is set precisely into place in the hull. Pending delivery, these sections of the ship's side are stockpiled one above the other with timbers between to prevent damage to the steel shapes.

Pre-assembly of fore and afterpeaks has been standard practice at both of the yards. Crews who specialize in this operation put the steel together into assemblies that weigh about 60 tons for the forepeak and 42 tons for the afterpeak.

Shell plates for inner bottoms

The trend toward still more prefabrication is well illustrated by the plans that were being perfected, as this was written, for putting the outer shell on the inner bottom sections. The plates of the outer shell have heretofore been laid out in the ways and they have awaited arrival of the "inner bottom," a pre-assembly of plates and transverse beams (intercostals) weighing up to 40 tons or more.

The assembly now proposed includes the outer or shell plates with the remainder of the inner bottom section, thus increasing the weight to be handled from a maximum of 42 tons before the shell was put on, to a total of 75 tons. This inconvenience of more weight is a small price to pay for cutting the "bottleneck" time devoted to inner bottoms from seven days with the old method, to an estimated two days with the new—a five-day saving!

This advance would not have been feasible with riveted joints which must be staggered. Welding, which makes a joint stronger than the plates it unites, permits breaking joints all the way across the hull on one line, and hence an inner bottom, complete with outer shell up to a 30-ft. length, can be effectively set in place on the ways.

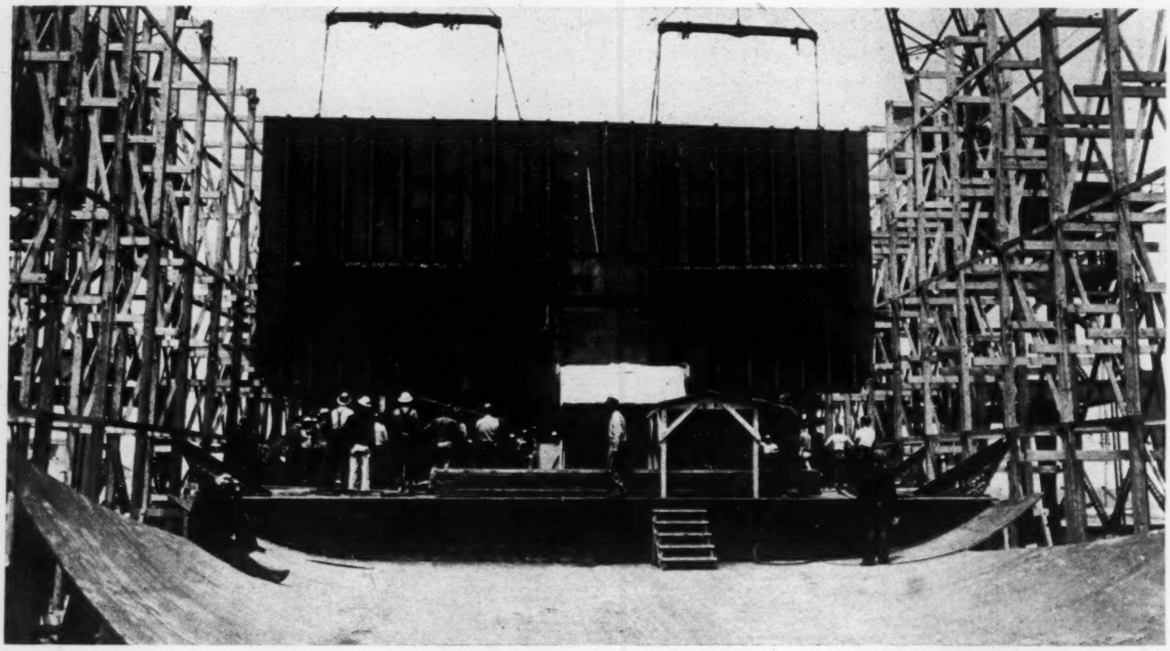
With pre-assembly every care has been given to making as much of the welding as possible downhand. About 90 percent of the seams in a steel vessel once made with rivets are now made by automatic welding machines.

On the inner bottoms the sequence of welding is planned to give all advantage possible to the welder. The first welds are made with the section upside down. When welds on the opposite side are to be made, turning jigs are bolted to both sides of the section, cranes lift it bodily, turn it over and replace it on the welding platform for completion.

The turning jigs each have a double sheave corresponding to double sheave blocks slung from the crane hooks. An endless cable passes around these sheaves, thus permitting rotation which is controlled by two whip lines, one to pull the section over and the other as a snubber to control the movement.

Deckhouse pre-assembly

The heaviest pre-assemblies thus far handled at these yards are the deckhouses in which numerous crafts (electricians, plumbers, steamfitters, carpenters, painters, glaziers, etc.) must work. By doing this work in the yard instead of on a ship at the outfit-



Typical use of two cranes in placing a bulkhead section. This operation follows closely behind inner bottom installation.

ting dock, the operations are removed from a "bottleneck" classification, i.e., they can be done in advance without the risk that any stoppage will delay completion and delivery of the ship.

The midship deckhouse goes to the hull in four pre-assembled parts weighing respectively 46, 50, 68 and 70 tons. A stress analysis was made to determine best methods of attaching lifting tackle to such large and unwieldy sections whose normal function does not require strength and stiffness to carry stresses as large as those caused by lifting. Finally, a scale model was made to observe the lifting operation.

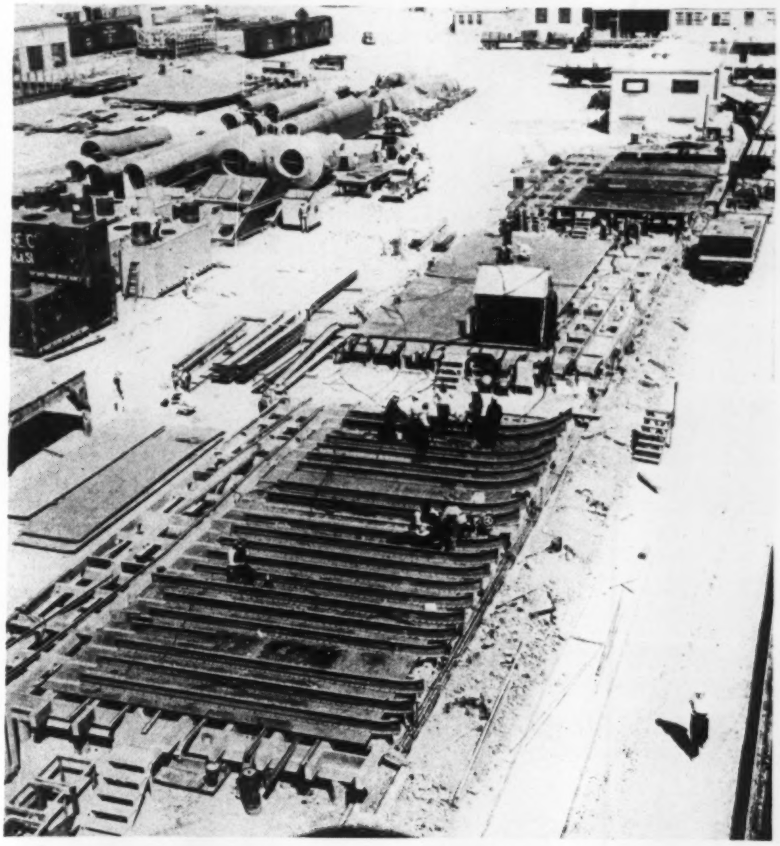
How deckhouse sections are lifted

Two cranes are used to handle these heavy sections. A typical arrangement, used on the forward, or flying bridge section of the midship deckhouse, is as follows: From each hook lifting cables go to opposite ends of a spreader beam. From the ends of this spreader lifting lines drop 28 ft. vertically to a lifting beam only 2 ft. above the center of gravity of the section and parallel with the ship's center line. This beam, an 18-in. steel channel 16 ft. long, is bolted temporarily to the outer side of the deckhouse section.

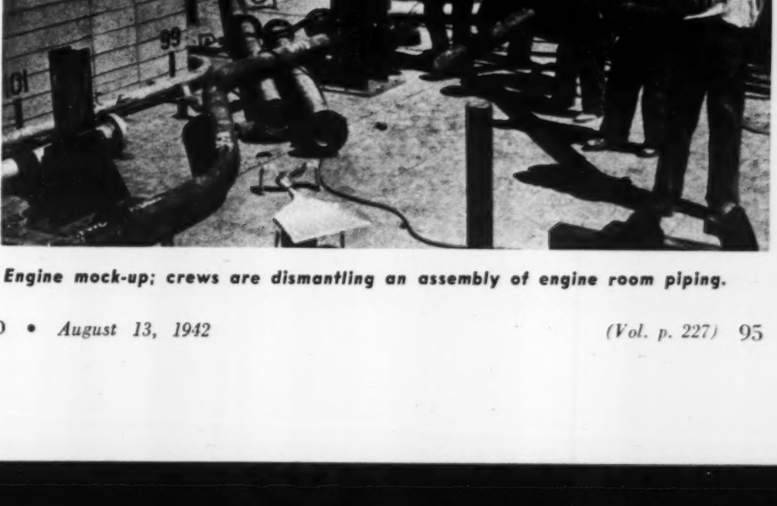
At the forward end of this section (whose dimension parallel to the ship's center line is 15 ft.) are the vertical steel plates of a bulkhead, which serve as a means of stress distribution across this end. The aft end, on the other hand, has no transverse stiffening and requires support for lifting. This is provided by vertical pipe struts between decks to take compression while diagonal cables, attached to lugs welded on for the lifting operation, take the tension. The diagonals (cables) and the compression struts are adjustable, the latter by means of sleeves, which have right and left-hand threads, and the former by turnbuckle. Thus, the stresses in the aft end of the section can be distributed so that the lifting operation in no wise distorts the structure. Between the boat deck and the main deck, the latter being the bottom of the section, pipe struts and diagonal cables form what is virtually a four-panel truss athwartships, these four panels totaling the 57-ft. width of the ship.

Each deckhouse section carries with it the main deck, to the underside of which are attached the floorbeams running athwartships. The longitudinal girders on which these floorbeams rest are erected with the hull and constitute the supports onto which the deckhouse section is lowered when it is placed on the hull.

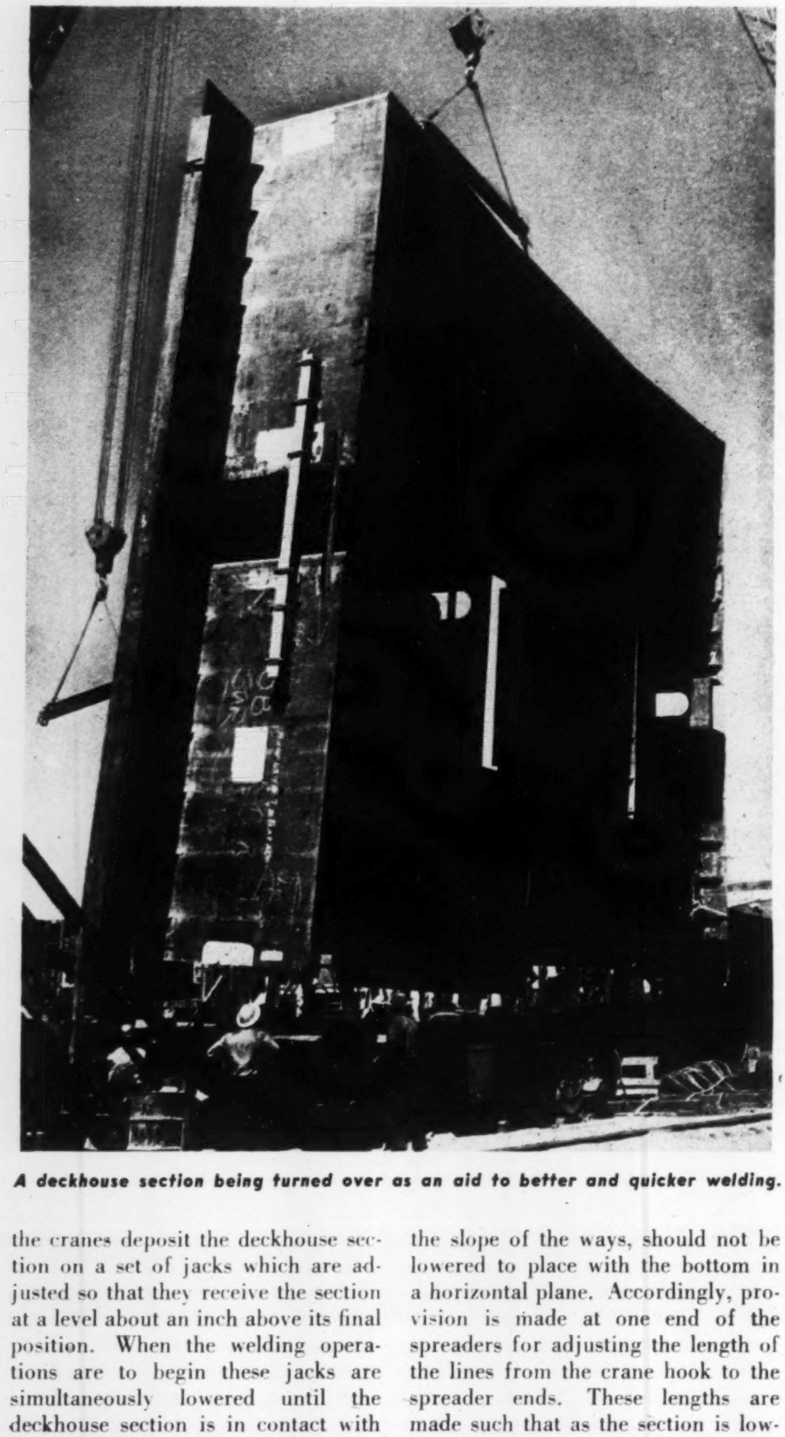
The main deck beams that come with the pre-assembled deck house have an L-section and the fore-and-aft girders to which they are to be welded are notched to receive each beam as it is lowered to place. If this lowering operation were merely delivery to final place by the cranes there would be actual bearing at only a few points. To insure full contact for welding,



Portions of the hull side, 27x50 ft. in size weighing about 30 tons, are assembled in the areas adjoining the ways. This view is from the revolving crane.



Engine mock-up; crews are dismantling an assembly of engine room piping.



A deckhouse section being turned over as an aid to better and quicker welding.

the cranes deposit the deckhouse section on a set of jacks which are adjusted so that they receive the section at a level about an inch above its final position. When the welding operations are to begin these jacks are simultaneously lowered until the deckhouse section is in contact with the longitudinal girders. At this time every third joint between floorbeams and girders is welded. The jacks are backed off a little more and another third of the total number of joints are welded. Finally, with the jacks almost entirely released, the remaining one-third of the welding is done.

In order to fit nicely into position, the deckhouse sections, because of the slope of the ways, should not be lowered to place with the bottom in a horizontal plane. Accordingly, provision is made at one end of the spreaders for adjusting the length of the lines from the crane hook to the spreader ends. These lengths are made such that as the section is lowered to place the bottom will hang fair with the sheer of the deck.

Accomplishments and administration

Because yard No. 2, after only nine months of operation, has been through two expansions, there has been considerable interference with the actual shipbuilding operations. Even so, this yard with only 15,000 employees had brought the number of man hours per ship down to 435,000 as of June launchings and the trend was still downward. The construction time then on EC-2 ships in No. 2 yard was 89 days on the ways and 18 days at the outfitting dock, a total of 107 days from keel laying to delivery. Up to that time not enough large gantry cranes were available to provide a full complement for all of the ways. However, the program was for one launching per week until late July, by which time it was expected that six ships per month could be turned out. Yard No. 1, which recently completed a contract on 10,000-ton vessels for the British Purchasing Commission, has just changed over its ways for the EC-2 type. Henry J. Kaiser is president and Clay P. Bedford is general manager of the corporations that own and operate both yards.

English Bridges Repaired With Pre-cast Concrete

With the timber supply short, British civil engineers are paying increased attention to standard units of pre-cast concrete for quick repairs on blitzed roads and crossings. For spans from 4 to 8 ft., hexagonal concrete pipes of 15-in. diameter with 2¼-in. walls are recommended. These can be built up from the streambed in honeycomb fashion by unskilled labor; the only preparation required is excavation in the streambed to obtain a firm and level foundation. If the pipes are laid with staggered end joints and fine mortar is used to hold them together, fairly strong structures can be erected in a short time. Pre-cast solid closing pieces and half-length pipes as side closers are provided in standard sizes. All the parts can be easily dismantled and used repeatedly.

For longer spans pre-cast concrete slabs are used. Slabs 27 in. wide and 8½ to 10½ in. thick are sufficient for spans of 9 to 12 ft., especially if constructed with special joints. For spans of 15 to 20-ft. pre-cast T-beams weighing 2,800 lb. in 15-ft. lengths and 4,300 lb. in 20-ft. lengths are used with tiebolts running across the width of the bridge. These can be left as permanent structures, and precast concrete sole plates and blocks are available for use with these beams, so that in situ work is avoided altogether.

Cohesionless Soil Samples by Freezing

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Contents in Brief—*A technique for obtaining undisturbed cohesionless soil samples by freezing the lower portion of the material to form a plug has been developed by the Providence, R. I. District, U. S. Engineers. Freezing is accomplished by the circulation of pure grain alcohol of —30 deg. C. temperature through a chamber surrounding the lower end of the sampler. Installation of this chamber requires sinking a 10-in. casing down to the top of the stratum to be tested and inside this a 6-in. pipe to the depth at which the sample is desired. Then from the bottom of the smaller casing a $2\frac{7}{8}$-in. dia. sampler is extended to inclose the desired material; removal of the soil outside the sample tube permits the freezing chamber to be inserted.*

MOST outstanding of the several advanced techniques developed by the Providence District, U. S. Engineers, for obtaining undisturbed soil samples is the freezing method for cohesionless materials. This scheme excludes all vibration and impact shocks induced in older methods by ramming the sampler and driving the casing. The new procedure is to enclose by rapid and continuous penetration the soil within a thin-walled, piston-type sampler, and then to freeze in the bottom of the sample tube a temporary soil plug, which prevents movement and loss of the enclosed material.

Each sampling by this method requires six steps, as outlined in Fig. 1. At the start of operations, any overlying stratum not to be studied is closed off by sinking a 10-in. casing to the top of the stratum to be systematically sampled. From here on all operations are within a standard 6-in. dia. flush-jointed casing placed inside the 10-in. pipe; use of the larger pipe greatly reduces the friction in sinking the smaller casing. The 6-in. pipe, which is equipped with a shoe and cutting edge, is carefully lowered in several stages while friction on the outside is reduced by jet action. The sinking is facilitated by turning the casing and removing the material within by a special cleanout auger. An excess head of water is maintained in the casing at all times to prevent any upward soil movement or "piping."

The method of advancing the 6-in. casing is an important factor in the success of the sampling operation. Any disturbance prior to the actual sampling will generally cause a decrease in the void ratio with loose cohesionless sediments and an increase in the ratio with a dense soil. It is important, therefore, that advance of the casing be accomplished with minimum disturbance. The method just described accomplishes this purpose with almost as little work as the older, violent and unsatisfactory methods.

To enclose the actual sample to be tested a $2\frac{7}{8}$-in. I.D. steel tube, 36 in. long, is employed. This tube is equipped with a tight-fitting piston and removable cutting edges that are dimensioned to provide different clearances. The $2\frac{7}{8}$-in. pipe is driven into the sediment a distance of 28 in. below the cutting edge of the 6-in. casing by a fast continuous drive. The piston of the sampler is held rigid and at the same elevation by a small pipe extending to the surface, where it is clamped, while the tube is forced downward by a block and tackle arrangement operating from an A-frame placed over the drillhole. Power for operating the tackle is supplied by an 8-hp. gasoline engine. The procedure of jacking the sampler into position is shown as Operation 4 in Fig. 1, while details of the sampler are shown in Fig. 3.

To aid in centering the sample tube and maintain its vertical position during jacking, a special piece of equipment called the "annular auger" is used. The chief function of this device, however, is first to aid in sink-

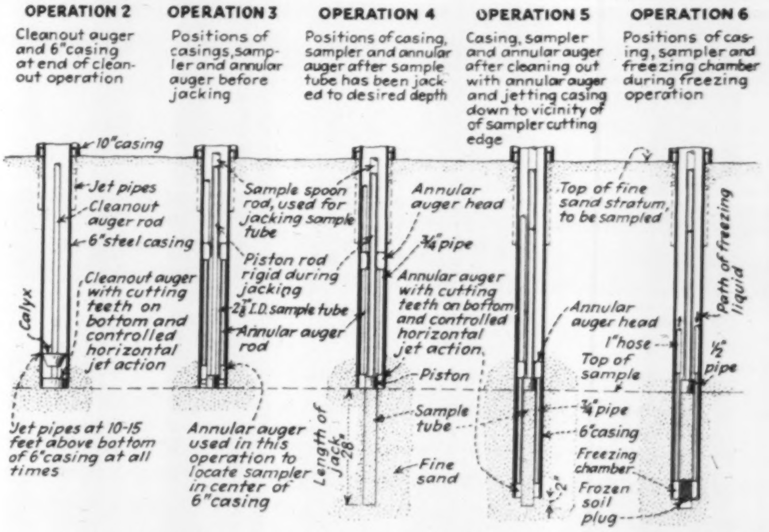

OPERATION 2
Cleanout auger and 6" casing at end of cleanout operation
OPERATION 3
Positions of casings, sampler and annular auger before jacking
OPERATION 4
Positions of casing, sampler and annular auger after sample tube has been jacked to desired depth
OPERATION 5
Casing, sampler and annular auger after cleaning out with annular auger and jetting casing down to vicinity of of sampler cutting edge
OPERATION 6
Positions of casing, sampler and freezing chamber during freezing operation
10" casing
Jet pipes
Cleanout auger rod
6" steel casing
Cleanout auger with cutting teeth on bottom and controlled horizontal jet action
Calyx
Jet pipes at 10-15 feet above bottom of 6" casing at all times
Sample spoon rod, used for jacking sample tube
Piston rod rigid during jacking
2⅞" I.D. sample tube
Annular auger rod
Annular auger used in this operation to locate sampler in center of 6" casing
Length of jack 28"
Annular auger head
¾" pipe
Annular auger with cutting teeth on bottom and controlled horizontal jet action
Piston
Sample tube
Fine sand
Top of fine sand stratum, to be sampled
Annular auger head
2"
Path of freezing liquid
1" hose
½" pipe
Top of sample
¾" pipe
6" casing
Freezing chamber
Frozen soil plug

Fig. 1. Obtaining cohesionless soil samples by the freezing method includes six operations. The first step, not shown, consists of sinking a 10-in. casing to the top of the stratum to be sampled and then installing inside of this a 6-in. casing that is extended to the depth at which a sample is desired. The other five steps are illustrated above.

ing the 6-in. casing to the position indicated in Operation 5, Fig. 1. The auger is also used, after the sampler has been driven to the desired depth, to remove the sand surrounding the sampling tube. By turning the auger, sand on the outside of the sampler is loosened and immediately carried away by a controlled jet action. Completion of this operation and removal of the auger provides an annular space between the sampling tube and the wall of the 6-in. casing. This space extends to the bottom of the tube and makes available sufficient room to accommodate the small freezing chamber or refrigerating unit. The chamber in place is shown by Operation 6 of Fig. 1.

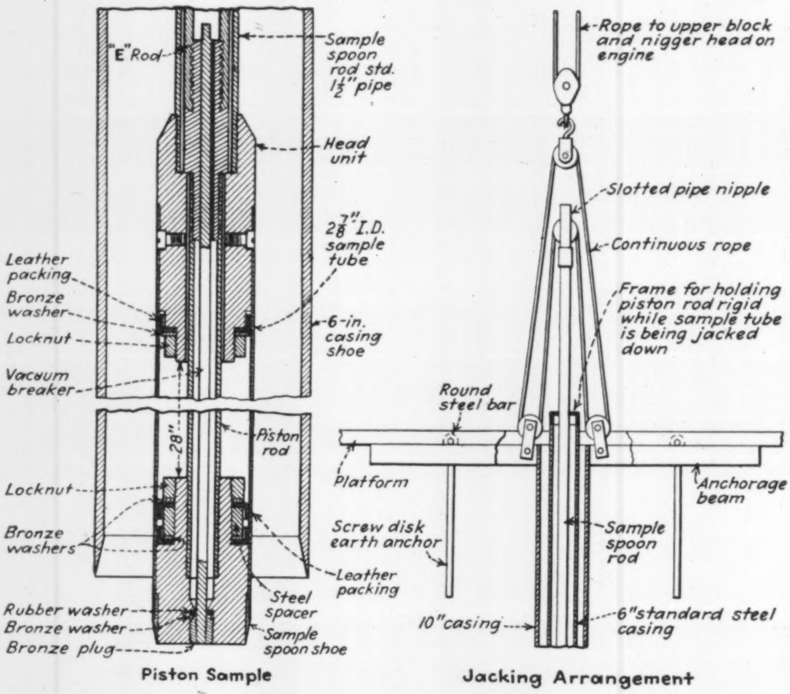
Frozen plug 7 inches long

The refrigerating unit is shown in detail by Fig. 3. When in place at the bottom of the boring, the unit can produce in the lower part of the sample a frozen soil plug of variable length but averaging about 7 in. The freezing action is accomplished by circulating pure grain alcohol at approximately —30 deg. C. through the chamber for about 15 minutes. This low temperature is obtained by pumping the alcohol through a copper coil immersed in alcohol that is kept at a temperature of about —80 deg. C. by dry ice. The cooling equipment is assembled on the surface and is shown in Fig. 4.

With the plug frozen, the next step is withdrawal of the sampler from the boring. Removal of the sampler is easily accomplished by using the block and tackle previously mentioned without movement or loss of the sample, which in all other methods is frequently the cause of failure.

Testing the sample

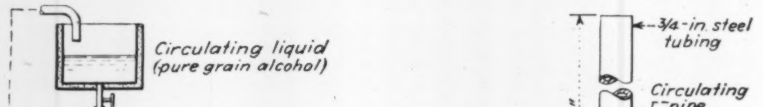
Experience to date indicates a certainty of complete success of the freezing method whenever this technique is used, but to maintain the undisturbed condition of the soil it is necessary to test the sample as soon as possible once it has been obtained. The best way to do this is to conduct the tests in a small laboratory set up near the scene of boring operations. If this is not possible, the sample, contained in its tube, may be carefully sealed and transported to the central laboratory. When this latter method is followed, particular care must be exercised to maintain the tube in a vertical position during the


Piston Sample

Jacking Arrangement

"E" Rod
Sample spoon rod std. 1½" pipe
Head unit
2⅞" I.D. sample tube
Leather packing
Bronze washer
Locknut
6-in. casing shoe
Vacuum breaker
28"
Piston rod
Locknut
Bronze washers
Leather packing
Steel spacer
Rubber washer
Bronze washer
Bronze plug
Sample spoon shoe
Rope to upper block and nigger head on engine
Slotted pipe nipple
Continuous rope
Frame for holding piston rod rigid while sample tube is being jacked down
Round steel bar
Platform
Anchorage beam
Screw disk earth anchor
Sample spoon rod
10" casing
6" standard steel casing

Fig. 2. Soil sample is enclosed by a 2⅞-in. tube extended 28 in. downward from bottom of 6-in. casing. Details of the sampler are shown at the left, while the jacking arrangement is illustrated at the right.


Surface Freezing Equipment

Vertical Cross Section

Freezing Unit

Circulating liquid (pure grain alcohol)
Suction hose
Sawdust insulation
Pure grain alcohol
Platform pump
60'-1" copper coil
Direction of flow of circulating liquid
Sample spoon rod standard 1-½" pipe
1" hose to and from freezing chamber
6" casing
Jet pipes standard ¾" pipes
10" casing
¾-in. steel tubing
42"
Circulating pipe
Circulating chamber
3/16" steel wire
Steel tubing 5-¾" x 3/16"
½"
¼"
½"
5½"
5"
G
G
¾"
⅛"
3/16"
⅛"
3⅛"
Brass linear
45°
30°
Section G-6
Asbestos insulation
Brass liner
Circulating pipe
Outer shell

Fig. 3. Surface freezing equipment (left) supplies pure grain alcohol to freezing chamber (right) at the bottom of the boring at a temperature of about —30 deg. C.

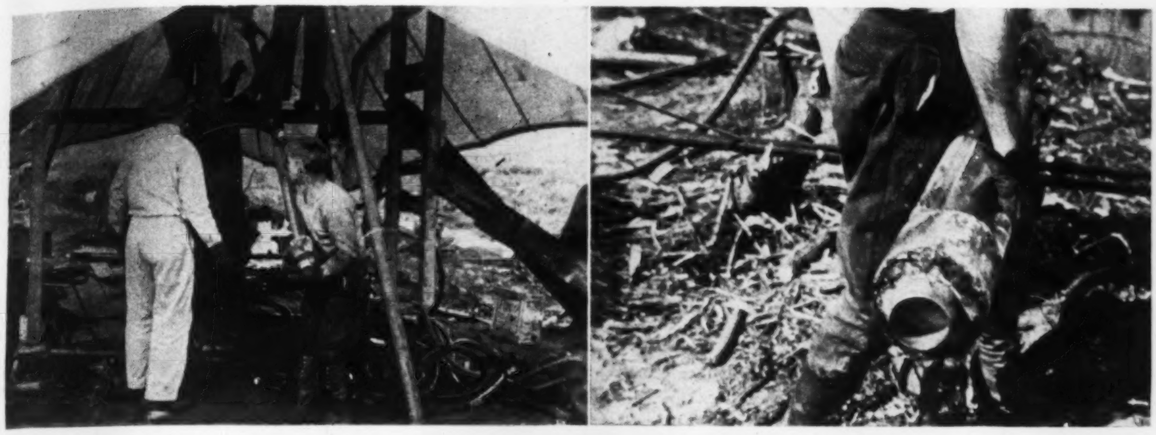


Fig. 4. Sampler removed from the boring, showing the freezing chamber at lower end, and the rubber hose connecting the freezing chamber with the platform pump, which is in the background covered with frost. At right, a close-up of the lower end of the sampler, freezing chamber, and frozen plug after withdrawal of the sampler from the boring.

intervening time between obtaining the sample at the boring and testing the material in the laboratory. The field party should furnish information as to the exact length of the sample shipped so that the laboratory will be able to determine the amount of consolidation of the soil during its transportation.

Length of sample about 2 ft.

As noted previously, the samples furnished by this technique are contained within a steel tube 2⅞-in. in diameter and 36 in. long. Although the length of drive is 28 in., the length of the sample recovered is always about 3 or 4 in. less, due to the material dropping out of that portion of the sample extending below the frozen plug. This cannot be avoided, since to remove more soil in order to lower the freezing unit may seriously disturb the sample's structure and change its void ratio.

Upon withdrawal of the sampler from the boring, the freezing chamber is slid off the lower end, and the vacuum breaker rod (See Fig. 4) is removed. This operation is necessary to establish atmospheric conditions at the top of the sample, so that the sampler head may be removed. The open or upper end of the tube is then tightly but temporarily plugged and the specimen taken to the laboratory set up near the scene of the boring operations.

Careful handling required

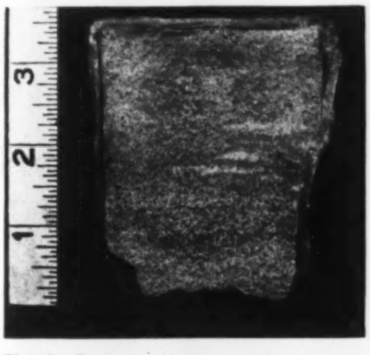


Fig. 5. Cross-section of a frozen plug showing undisturbed stratifications of a cohesionless soil.

In the laboratory, the soil is removed in cylindrical increments ranging in height from 2 to 1½ in. At this stage of the testing, very careful handling is required to establish those measurements of volume and weight necessary for moisture-content and void-ratio determinations. During these operations, the soil plug is maintained in a frozen condition. Once all the unfrozen material has been removed from within the sampler, the soil plug is then withdrawn, coated with paraffin, and preserved for further study and photographic record.

Additional details of the new techniques developed at Providence are contained in the report *Undisturbed Sampling of Sediments, Equipment and Procedure*, which was prepared by the Providence District for limited distribution.

For the Providence District office, Col. H. S. Bishop, Jr., is district engineer; T. S. Burns, chief of the engineering division; and the writer, senior geologist.

Operating Experiences at Anacostia Sewage Plant

Completing its first full year of operation at the end of 1941, the Anacostia River sewage treatment works of the Washington (D. C.) Suburban Sanitary District accomplished 35 percent reduction of biochemical oxygen demand and 62 percent removal of suspended solids by primary treatment alone. Chlorination of the settled sewage afforded a further reduction in B.O.D. of 9 percent and in suspended solids of 8 percent. (See *ENR* May 8, 1941, p. 748, for a complete description of the plant).

This note on operating results was given in the annual report (1941) of the sanitary engineering bureau of the Maryland State Department of Health, which points out that the average daily flow to the plant was 5.6 mg.; the designed capacity is 7.5 mg. Sewage received at the plant was fairly weak, having an average B.O.D. of 139 ppm. and a suspended solids content of 150 ppm.

Dewatering of sludge on vacuum filters was inaugurated during the summer, and by the end of the year approximately 1,100 tons of wet sludge had been filtered. The use of chlorine in the grease flotation process did not produce the expected results and consequently its use has been discontinued, according to the report.

Acid Treatment Quadruples Flow In a War Plant Water Well

***Contents in Brief**—A deep well at an ordnance plant under construction in the Midwest provided an inadequate water supply. Investigation by electrograph revealed possibilities of increasing the flow by treatment with hydrochloric acid. The acidizing process increased the well flow from 166 g.p.m. to 1,000 g.p.m. Other interesting features of this plant included the use of corrugated asbestos-cement siding and roofing over steel frames for fireproof manufacturing buildings, and laminated wood roof trusses for tile-walled warehouses, shops and garages.*

AT ONE OF THE CHEMICAL PLANTS being built in the Middle West by the U. S. Army ordnance department to make ammonium nitrate for power and shell loading plants, the source of processing and potable water proved to be a problem. A well supply was necessary in this case, to be augmented by a filtered surface supply for fire, washing and powerhouse condensing purposes. Deep drilling into a dolomite and sandstone formation revealed a water supply of desired quality, but the quantity was disappointing. Treatment of the well with inhibited hydrochloric acid, however, more than quadrupled the flow and produced an ample supply.

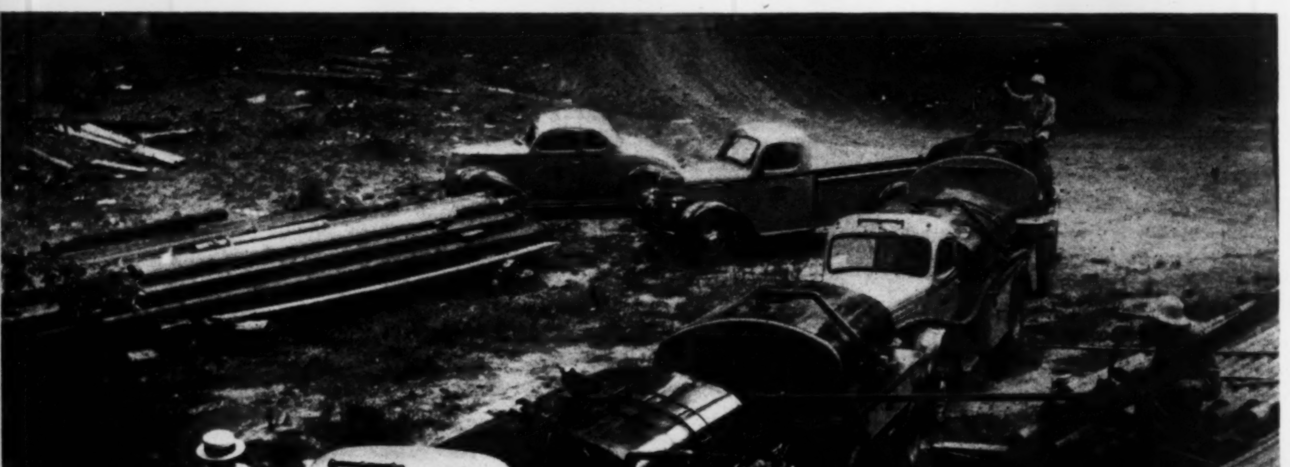
A 10-in. well was drilled to a depth of 901 ft. through various formations of limestone, chert, dolomite and sandstone, ending up in a water-bearing strata of mixed sandstone and dolomite. It was permanently cased to a depth of 335 ft., the casing being cemented in place. Below the casing several water-bearing strata were penetrated. Upon completion of drilling, water rose to within 65 ft of the surface.

As soon as a deep well pump could be installed, the well was given a pump test, which proved very disappointing. The pump assembly consisted of 450 ft. of intermediate column and shaft, 10 ft. of suction and an 18-stage 10-in. bowl assembly, driven by a 100-hp. motor. Over a 26½-hr. test the discharge varied from 152 to 170 g.p.m., much less than the desired flow.

Electric log made of the well

Though a careful log of the hole had been made from cuttings during the drilling, it was decided to make an electric log of the hole by use of an electrograph in an effort to get a more accurate knowledge of the geologic formations and the possibility of greater water yield. The electrograph virtually photographs the formations penetrated by the drilling, thus revealing the exact location, with an accuracy of less than one

Fig. 1. Equipment for acidizing a well to increase the flow of water. Each tank holds 1,000 gal. of dilute hydrochloric acid solution. All four tanks are discharged through the pump on the front truck.



foot of depth, of water, oil or other deposits that might not have shown up in the drilling due to "mudding out" of small quantities. The electrical survey shows especially the porosity of the rock as determined from measurements of resistance to an electric current.

The log, made before the well was cased, was effective from top of water level in the well, that is from a depth of 65 ft. below the surface to the bottom of the well. Electrodes of the electrograph were immersed in a solution in the well which aided the transmission of the minute current involved. A graph charted by the instrument showed the electrical resistivity of the various formations that were encountered.

According to the contractor, the electric log eliminated the guesswork and corrected the errors made in logging the hole from cuttings brought up during drilling.

The log indicated water in a porous, sandy dolomite formation at depths from 340 to 350 ft.; a similar formation was found at 375 to 390 ft. Some water also was indicated in porous rock at 450 to 490 ft. and 610 to 635 ft.

Acidizing the well

As the water-producing formations were sandy dolomite, it was decided to treat the well with inhibited hydrochloric acid instead of shooting with nitroglycerine in an effort to increase the flow. Shooting has been successful in this area where river sand is encountered, but in dolomitie rocks chemical treatment is better, for the process dissolves away portions of the rock, thus enlarging the rock pores through which the water flows more readily into the well. Acidizing is used extensively in petroleum wells to increase and maintain production, but the process is relatively new in the water supply field.

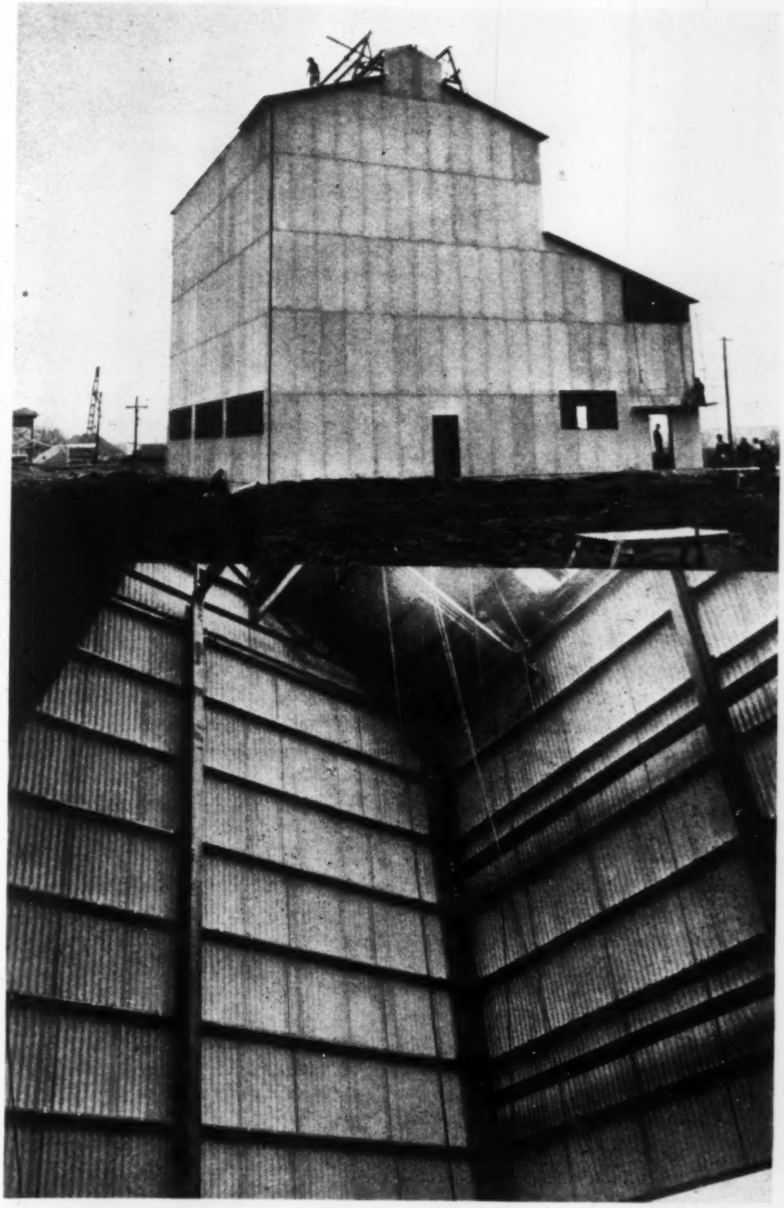


Fig. 4. Manufacturing buildings are simple steel frames covered top and sides with corrugated asbestos-cement sheets.

Inhibited hydrochloric acid is acid treated with organic compounds to control its corrosive action on iron and steel while leaving it free to attach lime in the rock formations. This makes it possible to use acid to increase the flow of wells without injury to the well casing, pumps and tanks. The acid used in this work also contained various agents for reducing surface tension, regulating the rate of reaction and preventing the formation of emulsions which often are formed when the chemicals combine with certain oils that are present in the rock.

As the formation in the upper part of the uncased hole appeared to be intermittently porous, and because too-heavy acidizing of the lower part of the well might bring in salt or sulphuric water, only a 15 percent solution was used.

How acid was added

Most of the water in the well was pumped out in advance of the acidizing, then the first charge of acid solution was pumped in under pressure through a reducer on the well casing. This charge consisted of 250 gal. of 30 percent acid strength, which when mixed with the water remaining in the well produced the 15 percent concentration desired. At intervals during the next two hours 2,250 gal. of acid solution were added in various amounts and strengths which, including the water inflow, amounted to an equivalent of 3,000 gal, at 15 percent strength. Then clear water was pumped into the well under pressure; 1,500 gal. at 25 psi., and 2,750 gal. more at 10 psi., which forced the acid solution back into the rock, where it was allowed to remain for several

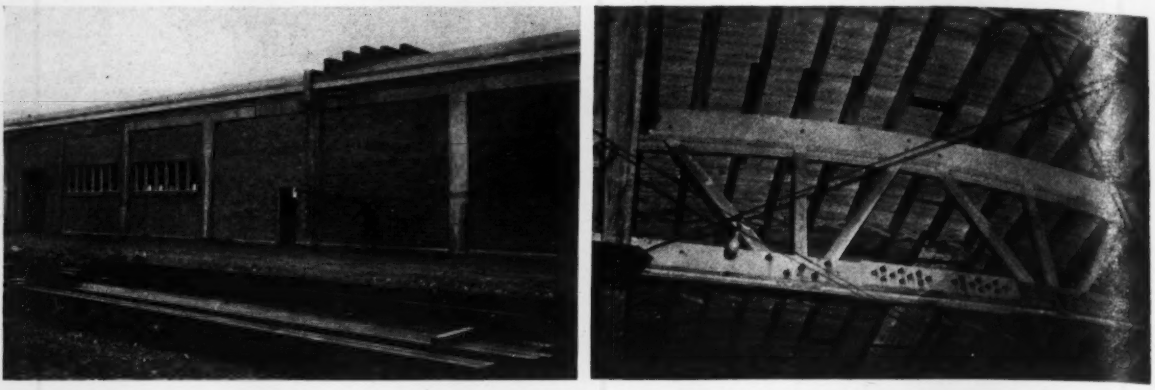


Fig. 2. Concrete frame, tile walls and wood truss roof make an excellent shop building. The exterior view shows a firewall extending through the roof. Roof framing details are shown in the right-hand view.

hours. Steady pumping finally removed all traces of the acid in the well supply.

Part of the acid reacted with the dolemite, forming calcium chloride and carbon dioxide. The chemical reaction opened up the small pores in the rock, permitting the water to flow freely. Pump tests after treatment showed the flow had been increased from an average of 166 g.p.m. to nearly 1,000 g.p.m.

Plant buildings

This ordnance plant covers a small area in comparison with small arms and shell loading plants, but because of the manufacturing equipment involved it runs into a big job in money.

There are three general types of buildings on the project: fireproof manufacturing buildings of steel frame and asbestos-cement sheeting on walls and roof; garages and shops of glazed tile walls and wood truss roofs carried on concrete columns; and all-wood administration, medical and guard buildings.

The administration buildings were rushed to early completion to serve as headquarters for the engineering and construction forces. The contractor also built the permanent shop buildings in a hurry for use for construction equipment repairs during the job.

The manufacturing units are extremely simple, built of steel columns and roof trusses, with steel purline and wall beams supporting corrugated sheets of asbestos-cement. Interiors are not finished. All foundations for the structures and machinery are concrete. Chat is used as coarse aggregate except for foundations of machines that transmit vibrations to their support.

Glazed hollow tile, unfinished on the interior, makes an attractive and satisfactory wall material for shops, garages and fire stations. It is used to form curtain or filler walls between concrete columns and under concrete header beams connecting the tops of columns in the wall line.

Most interesting from a structural standpoint in these buildings are the laminated wood roof trusses. The trusses, 61-ft. span, have a curved top chord of 7-ft. $7\frac{1}{2}$-in. rise. The lower chord consists of two 3x12-in. timbers of structural grade fir, spliced at the center with two 2x12-in. and one 3x12-in. wood plate 6 ft. long bolted up with twenty $\frac{7}{8}$-in. bolts. Web members are all single pieces of 3x6-in. dense No. 1 grade of yellow pine.

Upper chords are 18 pieces of 2x3-in. dense No. 1 yellow pine, made up in two ribs of nine pieces each of glued laminated construction. Top chords are spliced into three sections. Both chords are bound at the ends by a $10\text{x}\frac{3}{8}$-in. heel strap, bolted to the wood with six $\frac{7}{8}$-in bolts and twelve 4-in. shear plates. Longitudinal bracing is by steel rods. These trusses were fabricated at a lumber yard in a nearby city, as the comparatively small number required did not warrant the contractor setting up a fabrication shop.

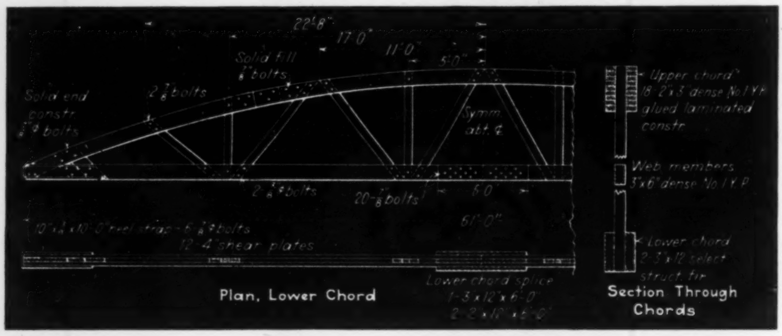


Fig. 3. Details of the wood roof trusses with laminated curved top chords. The truss has a span of 61 ft. and a rise of 7 ft. 7½ in.

Other features of the plant

While there are only ten miles of new road on the project, their construction was quite a job because of bad weather and wet soil conditions. First it was necessary to remove 18 in. of muck with backhoes and scrapers. Then a base of heavy stone was built up, stabilized with chat. Finer stone, mixed with chat, finished the road surface.

Building five miles of railroad to serve the plant was fairly simple for the grading was light.

An additional water supply from a stream is being developed for fire protection, some of the process requirements, and for condensing water at the boiler house. This supply will be filtered. Sewage will not be treated except for simple filtration through sand beds.

To conserve metal, all suspended piping between buildings is carried on wood posts.

Cantilever Girders Preferred

Charles H. Wood
Senior Civil Engineer (Retired)
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CONTINUOUS plate girder bridges are in great favor, but under many conditions cantilever girders are better. In the continuous bridge the bending moments at the interior supports are always greater than in the spans. This leads to an accumulation of cover plates at the supports, particularly in heavy girders, and at those points the diagonal web tension, which is the resultant of the horizontal fiber stress and the shear, may exceed the allowable limit.

On the other hand, in a cantilever with proper pier spacing and proper choice of the length of the arms, the bending moments at the piers and in the spans can be equalized or given any desired relation. Smaller moments at the piers than in the spans may be desirable with heavy girders, where the diagonal web tension may be the critical stress.

As an example, assume a 360-ft. bridge is to be designed to carry two four-lane roadways on three lines of girders in accordance with the 1941 specifications of the American Association of State Highway Officials for an H-20 loading. The bridge is to be a through structure with 114-in. web plates, a reinforced-concrete floor and a 3-in. concrete pavement. Because of space requirements the middle girder only will be considered, and that member is assumed to carry a dead load of 8,000 lb. per lin. ft. and three full traffic lanes (see specifications referred to above).

As part of the studies for the most satisfactory bridge the accompanying graphs were prepared.

The following stresses provide a comparison between the three-span cantilever bridge and a continuous girder of the same span lengths. In the computations for the continuous girder a constant moment of inertia is assumed; more exact figures would increase the moments at the supports and decrease them in the spans. The moment curves for the two structures under study are shown at the right. Maximum moments in millions of foot-pounds are as follows:

	End spans	At piers	Middle span	Total
Cantilever	+14.4	—12.0	+14.0	66.8
Continuous	+11.7	—16.7	+10.1	66.9

The column headed "Total" is the arithmetical sum of the five maximum moments, and the totals are practically the same for both designs.

Now assume a girder section as follows: web, 114 x ¾ in.; flange angles, 8x8x1⅛ in.; and 22-in. wide cover plates of a 2¾-in. total thickness. The gross moment of inertia is 709,000 in.^{4} Assuming that the net amount of inertia equals 595,000 in.^{4}, the extreme fiber stresses in pounds per square inch will then be as follows:

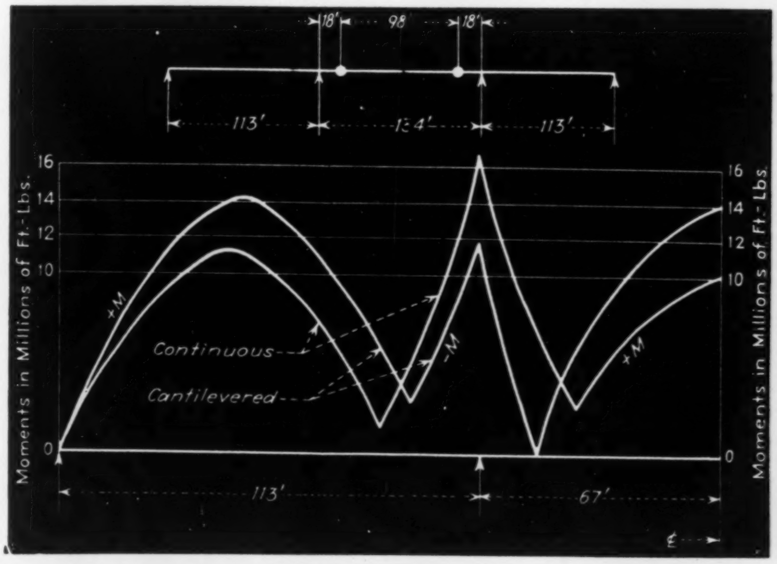
	End spans	At piers	Middle span
Cantilever	17,400	14,500	17,000
Continuous	14,200	20,200	12,200

Likewise, the diagonal web tension at the piers on the inner gage line of the flange angles will be 17,000 psi. for the cantilever and 21,000 psi. for the continuous structure. It should be noted that the practice of the Public Roads Administration in computing the diagonal web tension by the usual formulas is to use the net moment of inertia for fiber stress and the gross moment of inertia for shear.

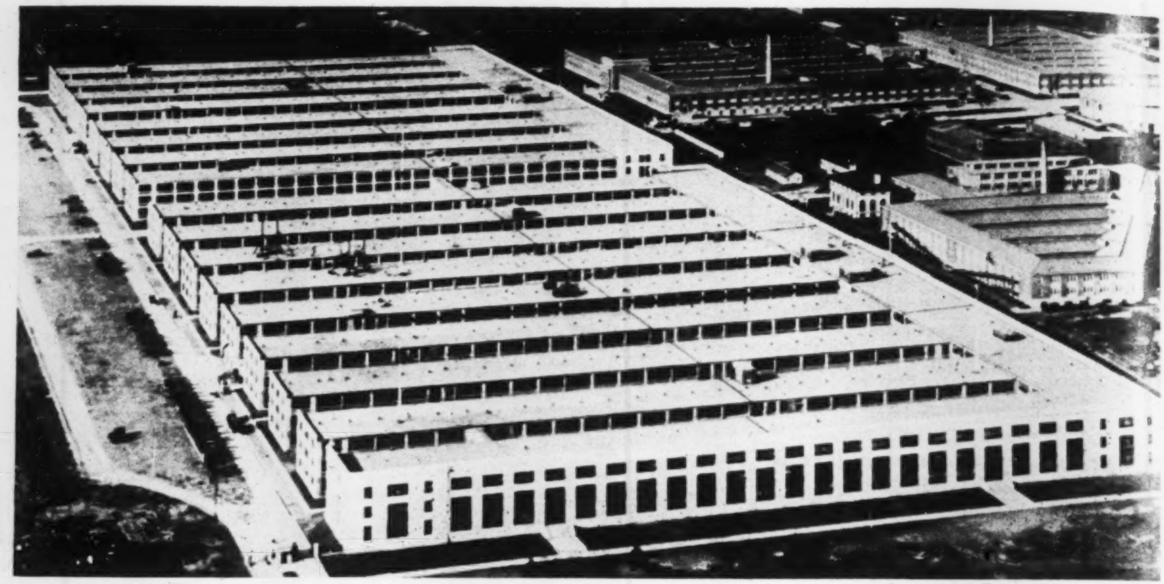
As the maximum horizontal fiber stress, also the maximum diagonal web tension, allowed by the specifications is 18,000 psi., it is evident that the section assumed is a bit heavy for the cantilever but inadequate for the continuous girder. The only way the flange can be increased to reduce the fiber stress and the diagonal web tension at the piers in the continuous design is by the addition of side plates, since the flange assumed is the maximum allowed by the specifications without side plates. But side plates are ineffective as flange area and lead to awkward, cumbersome field splices.

In addition to control of the bending moments as described, the cantilever has other advantages over the continuous type. These include: (1) stresses are not affected by an unequal settlement of the substructure or by errors in camber of the superstructure; (2) field splices are reduced in number or entirely eliminated; (3) the number of fixed bearings, which resist all longitudinal forces, is greater, as a continuous girder can have but one fixed bearing; and (4) the computations are simpler.

The cantilever has one disadvantage in that the live-load deflections, particularly in the anchor spans which deflect as if they were simple spans, are greater than in the continuous girder. However, if a reasonable depth ratio is used, the deflections can be kept well within the maximum allowed or 1/800 or the span. In the bridges illustrated the deflections are considerably less than the maximum allowable.



Comparison of maximum moments in continuous and cantilever 3-span bridges.



Courtesy of Turner Construction Co.

Fig. 1. Navy and Munitions Building in Washington, D. C. shortly after its completion in 1918.

How We Did It Before

***Contents in Brief**—Several morale-building schemes that might be applied to present-day building construction and a speed record that challenges our present-day operations come from World War I construction of what was then the world's largest office building. In two months 5,000 piles were driven, and in 13½ weeks 68,000 cu.yd. of concrete were placed in a three-story 1,800,000 sq.ft. "temporary" structure, the present Navy and Munitions Building in Washington.*

RAPID CONSTRUCTION of the Navy and Munitions Building in Washington two decades ago provides some records and suggestions for speed and enthusiasm that might profitably be examined at this time. Then the world's largest office building, this three-story 1,800,000 sq.ft. structure, comparable in size only to the 41-story 1,700,000 sq.ft. Equitable Building in New York, was completed substantially in six months.

Despite a temporary classification in 1918 the structure is the present Navy and Munitions Building and is very much in use in the current war effort. The building was erected with a concrete frame at a cost only slightly more than less durable construction cost then and much less than any construction in Washington costs now.

Perhaps the project should be classed as two buildings, but as it is actually a connected structure and was built in a single operation by one general contractor, Turner Construction Co. of New York, it is classed as one.

Simple plan

The plan of the building is simple, consisting of parallel wings 500 ft. long and 60 ft. wide (separated by a 40-ft. wide light court) connected at the front, or north, side along B Street by a so-called "headhouse" 60 ft. in width. The Navy Department unit has nine such wings, making it 860 ft. wide; the Munitions Building has eight wings and is 760 ft. wide. A 100-ft. long runway, spanned by a covered bridge, connects the two structures. The individual wings of the building, separated from one another by the light courts, are connected by two covered gangways at the level of the second floor.

Since speed in erection demanded that the structural design be of the simplest type, the beam and girder system was selected. This treatment resulted in a scheme of uniform structural units throughout, all column spacing and distances between the girders being similar without exception, and without complicated connections at the columns. Floors are of reinforced concrete 3½ in. thick, with one-way reinforcement of ⅜-in. rods spaced 6 in. center to center, designed to support a live load of 75 lb. per sq.ft., and finished with a wearing surface of concrete. Columns are spaced 20 ft. apart throughout: interior columns are 18x18 in. in section; wall columns are 13½x28 in. The first story is 12 ft. 6 in. in height, and the second and third stories are 12 ft. each.

Gypsum board and plaster partitions are used generally, with an occasional partition of fire-resisting material. Ceilings, beams and columns reveal the structural concrete as the forms left it. Sash are steel, insuring rapidity of construction and large glazed areas affording ample natural lighting.

It was not expected that pile foundations would be needed, but preliminary work disclosed that the area on which the buildings were to stand was a portion of an old bed of the Potomac River. To reach solid ground through the fill and soft material actually required piling varying from 20 to 52 ft. in length. Where practicable, concrete piles (cast-in-place within predriven shells) were used; but in some cases the so-called "composite" piles, consisting of a wooden pile surmounted by one of concrete, were driven. The total number of piles driven was 5,048—the first one on March 25 and the last one on May 28. Four drivers were operated continuously by three shifts of workmen, 24 hours a day and seven days a week. Occupation of the buildings was delayed not more than 30 days beyond the originally scheduled time for completion by this pile-driving operation.

A construction plant was devised that admirably met the conditions existing (see *ENR* July 4, 1918, p. 21). A heavy trestle, 17 ft. in height, was built paralleling the entire length of the site (2,200 ft.) at the rear of the building. This trestle was designed to carry five-ton motor trucks and had an approach from the street level with a grade of 11.8 percent. Trucks hauled sand and gravel from a nearby river-dredging operation, and cement in bags from a railroad siding adjacent to the site. Eight storage units for the aggregate were placed at intervals under the trestle, each provided with separate bins for 55 cu.yd. of sand, 110 cu.yd. of gravel, and a suitable supply of cement. The aggregate bins were covered by gratings of 4 x 12-in. planking, set on edge, spaced 4 in. apart. Over this trestle a steady procession of trucks passed in one direction, dumping sand or gravel through the proper gratings or delivering sacked cement through chutes for storage as required.

Midway of alternate courts of the buildings, a concrete mixing plant was erected, connected with the aggregate storage by a straight track of narrow gage about 300 ft. long. Upon the tracks ran small cars of the industrial type, having separate compartments for sand and gravel, and controlled by an endless rope from a motor at each mixing plant. The cars were spotted under the aggregate bins, loaded with the proper quantities of aggregates and cement for a batch, and then transferred to the mixer. Each of the eight mixing plants on the job consisted of a 1¼-yd. mixer set below ground level and powered by a 40-hp. electric motor. The mixer delivered direct to a tower hoist that carried the concrete to the required elevation in the structure.

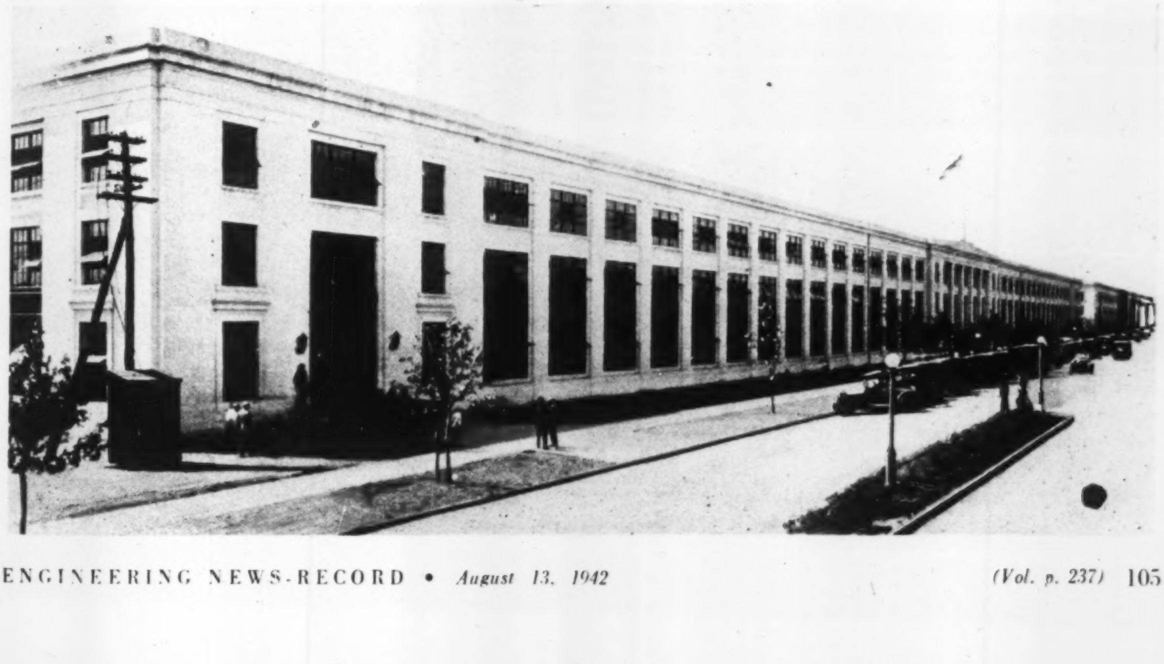
Concrete was delivered to place in two-wheeled carts traveling along the plank walks for the ground floors, and on timber runways on the forms for the upper two stories, no chuting being employed at any stage. The capacity of a mixing and distributing unit, with a crew of 50 men each, was 400 cu.yd. per day. Since each plant was entirely independent of the others, the theoretical maximum capacity on the job was 3,200 cu.yd. of concrete per ten-hour day, though practical conditions kept the recorded maximum down to 1,750 cu.yd., equivalent to a complete section of the building 300 ft. long.

The placing of the structural concrete was completed in thirteen and one-half weeks from April 5, 1918, an achievement that is believed to have established a record for this type of work as it required 68,000 cu.yd. of concrete. Construction followed progressive steps. Pile driving was completed first in definite areas and followed immediately by footing and superstructure concrete. As the drivers moved on the other work started, climbing to progressively higher levels as time passed. Concreting overlapped pile driving and at last displaced it, roofing was placed on the first wing before formwork was completed on the last, bricklaying followed the advance of the concrete frame, and partitions were being constructed on the upper floors before the last of the foundation work had been completed.

Inspirational activities

The maximum construction force on the buildings, including skilled and unskilled labor in the employ of the general contractor and all subcontractors, was about 3,400 men of whom 1,600 were classed as common laborers. This maximum was maintained through the months of June and July in 1918. Workmen of all building trades were employed in

Fig. 2. The 1918 vintage of motor car definitely ties this building to the era of the first World War. Erected as a temporary structure, this concrete building then contained the world's largest area of office space.



numbers unequaled by any previous job of the kind in the District of Columbia. Speed was a primary consideration in the work, and the wide area covered by the project made possible the effective employment of many large, independent gangs on the structure.

The contractor brought to bear every worthy incentive on his workmen of every rank in order to maintain a high rate of output. Inspirational and welfare activities of a variety adapted to the conditions were carried on throughout the life of the job. Charts were exhibited showing the weekly progress of construction, records of conspicuous gangs were posted and higher production encouraged. Frequent opportunities were afforded for the entire personnel to assemble in rallies and mass meetings at midday and evening. A patriotic spirit was fostered at such gatherings by addresses of persons of prominence, singing of popular songs, band music and the like. Evening entertainments such as boxing bouts, pie-eating contests and dancing competitions proved helpful in maintaining a degree of morale.

An illustrated paper abounding in cartoons, portraits of noteworthy gangs and individuals, personal references, and items of project news was issued weekly. An illustrator of known ability was engaged to reside on the job and produce posters and other pictorial work for the stimulation of enthusiasm. A "job flag," displaying an eagle poised on a broom, was designed by the illustrator and flown during the working shifts. The sale of war-saving stamps was pushed with considerable fanfare.

Large labor turnover

The economic conditions at the time were such as to offset a great volume of the inspirational work. Common labor caused the greatest concern, beginning about the middle of May to develop a migratory tendency. Rates of pay for unskilled labor on this job started at 30c. an hour and increased rapidly to 44c. to compete with the New York market. Railroad fare and expenses were paid for incoming workmen and return fare for the minority who continued at their tasks until the work was completed. Little difficulty was experienced in securing common labor up to the time the gang reached 1,000 men. During the first ten weeks of the project, up to May 15, only about 12 percent more men were on the payroll than actually worked daily.

During the life of the job 7,500 common laborers (principally Negro) were hired by the general contractor to recruit his labor gang, which never included more than 1,500 or 1,600 men at any one time. Keeping up the average force at this number for a period of seven weeks necessitated the hiring of 2,800 men, after 3,400 had already been sifted to establish the initial gang of 1,500.

Barracks for 1,200

As the work progressed it was found necessary to build barracks and provide a commissary to take care of the men as they came in. Accommodations for nearly 1,200 men were provided, the barracks serving not so much as a permanent abode as for a transfer station pending the location of the laborers in other lodgings. These quarters were crowded to capacity, during the height of construction, with the transients and such others as chose to keep up a longer occupancy.

The dates on which important phases of the project were begun and completed are given in the following list:

Contract signed and work commenced	Feb. 25, 1918
Appropriation granted	Mar. 28, 1918
Pile foundation decided on	Mar. 9, 1918
First pile driven	Mar. 25, 1918
Last pile driven	May 28, 1918
Concreting started (footings)	Apr. 5, 1918
Concreting finished	July 27, 1918
Moving in begun (Navy Department)	Aug. 17, 1918
Moving in begun (Munitions Building)	Aug. 31, 1918
Occupation complete	Early Oct. 1918

It is thus seen that only five and one half months elapsed between the signing of the contract and securing the beneficial occupancy of this record-breaking twin structure. Approximately 14,000 employees were regularly working in the building at the date of the Armistice.

The cost of the building was defrayed from the appropriation of $5,775,000 made available on March 28, 1918, and from a deficiency appropriation of $1,490,000. The deficiency is attributed in large part to the unexpected labor turnover, the enforced use of pile foundations, and the use of linoleum as a floor covering, at a cost of $325,000, not included in the original estimate. The cost of entire project thus amounts to a little more than $4 per sq.ft. or 29c. per cu.ft.

The contract was executed on a basis of cost-plus-a-fixed-fee that enabled the contractor to prosecute his work almost as speedily as the necessities of war bureaus demanded.

The project was constructed under the general direction of Commander A. L. Parson (CEC) USN, at that time assistant chief of the Bureau of Yards and Docks. Construction proceeded under the resident supervision of Lt. Comdr. O. A. Mechlin (CEC) USNR, acting as Public Works Officer. The architectural features of the design were developed by Lieut. Comdr. F. W. Southworth (CEC) USNR and H. J. Briggs, George F. Hales and Charles H. Stratton.

The general contractor was Turner Construction Co. of New York City for whom William E. Lyle was in general charge, H. E. Plumer was engineer and R. E. Eglehoff was general superintendent.

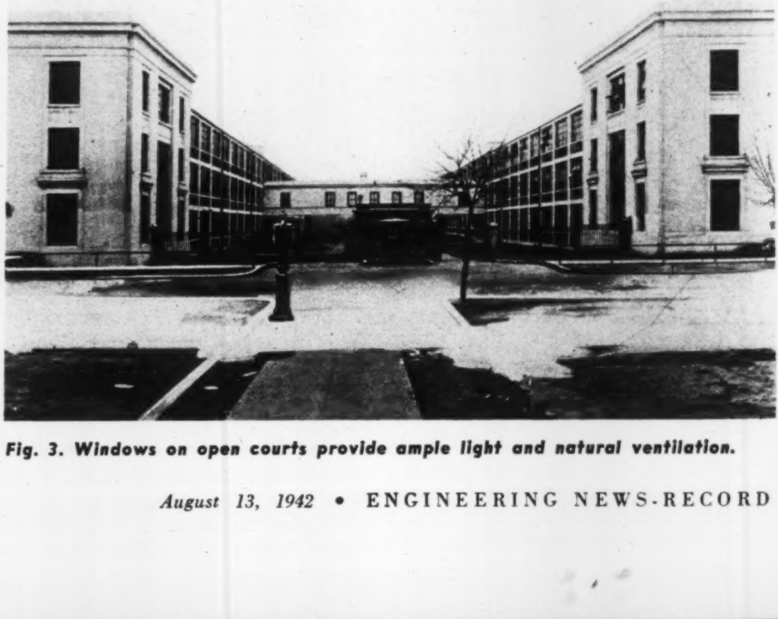


Fig. 3. Windows on open courts provide ample light and natural ventilation.

Three Dams to End Houston Floods

Contents in Brief—*Now under construction is a $32,000,000 flood-control program for Houston, Texas. Work includes construction of three earth dams and two canals. In addition 6½ miles of the existing Buffalo Bayou, which runs through the heart of the city, will be improved. When this project is complete protection will be provided for half-a-million people and many important industrial plants.*

Because of the many war industries at Houston, Texas, a $32,000,000 program is now underway to protect from floods over 100 square miles and half-a-million people in that area. The development, which is sponsored by the city of Houston and Harris County, is being carried out by the U. S. Corps of Engineers. Construction was started in February, and the project underway is one of 60 different plans studied before work was actually begun.

Six major construction jobs are planned, as shown in Fig. 1. These are: (1) Barker Dam, a 14-mile earthfill; (2) Addicks Reservoir, which will require an earthfill 10½ miles long; (3) a 5-mile-long earth dam to create White Oak Reservoir; (4) a 20-mile channel designated North Canal and connecting White Oak Reservoir with the San Jacinto River; (5) a 40-mile channel designated South Canal; and (6) rectification of 6½ miles of the existing Buffalo Bayou channel. Minor work includes a diversion dam at the head of the South Canal and a short waterway known as Brickhouse Gully Bypass Channel, which joins isolated headwaters of Brickhouse Gully with Buffalo Bayou.

That flood control is needed at Houston was proven by the floods of 1929 and 1935. The former, resulting from 6 to 12 in. of rainfall over the basins of White Oak and Buffalo bayous, caused property losses totalling $1,392,000. The 1935 flood resulted from a three-day rainfall averaging about 15 in. over the two basins and a peak precipitation of 20.8 in. near Westfield, Texas, which is about 18 miles from Houston. This flood caused $2,528,000 property damage, resulted in eight deaths, disrupted commerce in Houston's business district, and made the Port of Houston idle for a period of three days, due to excessive currents in the ship channel and heavy silt deposits.

Designed for severe storms

Although the heaviest annual rainfall ever recorded at Houston is 73 in., and the mean annual precipitation is 45 in., the construction proposed will provide flood-control protection against a 31.4-in. rainfall in three days. This precipitation occurred at Hearne, Texas, in the June 27-July 1, 1899 storm, which produced the greatest rainfall ever recorded in the United States for a large area. The maximum precipitation on a limited area during that storm was 31.4 in. in three days, and over a 1,000-square mile area 25.8 in. were received. The improvements planned are also to provide protection against rainfall intensities over small areas comparable in size to those with the Sept. 6-10, 1921,

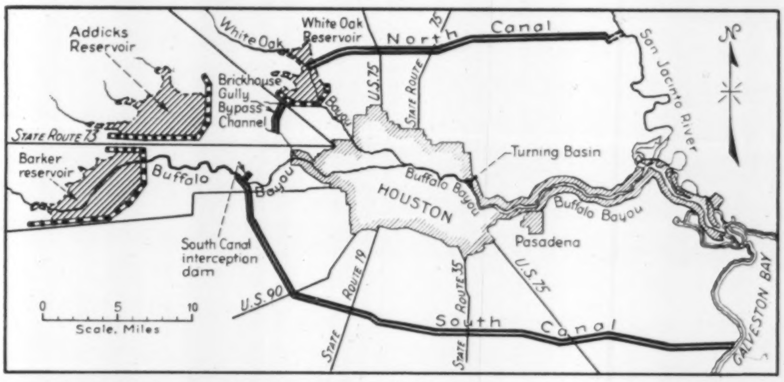


Fig. 1. Construction required to protect Houston from floods includes three earth dams, two long canals, and rectification of Buffalo Bayou for several miles.

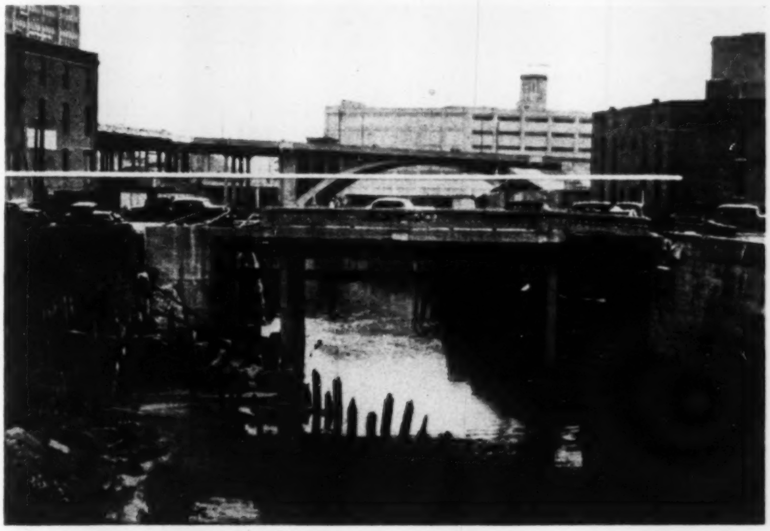


Fig. 2. Improvement of Buffalo Bayou in heart of Houston to increase that waterway's capacity requires removal of three bridges, including Milam St. Bridge above. White line shows maximum flood height during 1935 storm.

storm at Taylor, Texas. This storm included the greatest one-day rainfall over recorded in this country or 23.11 in. in 24 hours.

No permanent storage with the reservoir to be constructed at Houston is planned, since a maximum retention of from four to five days will reduce peak flows sufficiently to prevent flood damage. All the land to be flooded periodically by the storage reservoirs will be acquired, but grazing and farming over the areas will be permitted.

Construction in two stages

Two phases of construction are scheduled. With the first the rolled, earthfill dams to create Barker, Addicks, and White Oak reservoirs will be built, North Canal constructed, and Buffalo Bayou channel improved. Barker Dam, which will be 14 miles long to contain 2,773,000 cu.yd. of fill, will have a maximum height of 36 ft. This dam, like the other two, will have a 15-ft. wide crown, a sodded upstream slope of 1 on 3, and a sodded. 1 on 4 downstream slope. A 14,900-acre reservoir providing 135,800 arce-ft. of storage will be created to control the runoff from 153 square miles. Flows from the reservoir will be controlled by reinforced-concrete conduits and flood discharges will be into Buffalo Bayou until the South Canal is completed. Construction cost of Barker Dam is estimated at $1,955,000.

Addicks Dam will be of 40-ft. maximum height, 10½ miles long, and contain 2,850,000 cu.yd. of fill. Its construction will cost $1,800,000 and it will provide retention for 133,900 acre-ft. in a 13,600-acre reservoir to control runoff from 134 square miles. Flows from this reservoir will be controlled in a manner similar to Barker Dam, and flood discharge will also be into Buffalo Bayou until South Canal is built. The maximum storage elevation for Addicks Reservoir will be 11 ft. higher than with Barker Reservoir.

North Canal has big capacity

The earthfill for White Oak Reservoir will be 35 ft. in maximum height, average 20 ft., will be five miles long and contain 665,000 cu.yd. of fill. It is to provide storage for 24,400 acre-ft. to control the runoff from 72 square miles. Flow from the $500,000 White Oak Reservoir, will be diverted into San Jacinto River via the 20-mile North Canal, which will require 13,400,000 cu.yd. of excavation and placement of 15,796,000 cu.yd. of paving to protect the sides and bottom.

The canal will have a 22,000-cfs. capacity for about two-thirds of its length and for the remainder 32,000 cfs. The bottom width will vary from 25 to 35 ft. and the side slopes for the most part will be 1 on 2. Numerous reinforced-concrete structures will be required to cross highways, railroads and other waterways. Construction of North Canal is estimated to cost $5,766,000.

In the rectification of Buffalo Bayou channel 3,500,000 cu.yd. of excavation will be necessary to provide a waterway of 20-ft. bottom width, and extensive reconstruction will be required to remove foundations for numerous buildings and other structures that encroach upon the channel. Three birdges also will need to be rebuilt to remove the piers of these from the waterways. The length of Buffalo Bayou channel from the Barker Dam outlet works is about 25 miles through the heart of the city and it empties into the Houston ship channel, which is the city's 50-mile long connection to deep water in Galveston Bay.

Work just starting

Of the work included in the first phase of the project only Barker Dam and a portion of the rectification of Buffalo Bayou have been started and are scheduled for completion in 1943.

The second phase of the project includes building South Canal and a low earthfill dam to divert flood flows from Barker and Addicks Dams into this canal. The 40-mile waterway is to have sufficient capacity to carry also a large portion of the flows from the uncontrolled areas west and south of the canal. Thus, for the greater part of its length the canal will have a capacity of 15,000 cfs., but near its lower end a 21,000-cfs. capacity will be required. In the upper reaches the waterway will have a 30-ft. bottom width and 1 on 2 side slopes paved with reinforced-concrete slabs. The added capacity at the lower end will be obtained by increasing the bottom width. Construction of South Canal and its interception works is estimated to cost over $10,000,000.

All construction, except improvement of that portion of Buffalo Bayou within the city's limits, is being done by the Galveston District, U. S. Engineers, under the supervision of Col. L. E. Hewitt, district engineer. Major W. G. Saville, head of the construction division, and H. R. Norman, principal engineer, supervising engineering planning and design. J. M. Nagel is flood control engineer for the Harris County Flood Control District. The Macco Construction Co. of California, with Ben F. Wells, superintendent, under terms of a $1,777,000 contract is building Barker Dam, where Norman Brown is resident engineer for the War Department.

New construction is estimated to cost $22,000,000 and for this work the federal government will supply $9,000,000. The U. S. Engineers are to supply also $6,300,000 to purchase necessary right-of-ways and in addition to finance the reconstruction and relocation work. Thus, the federal government will supply between 18 and 19 million dollars in all and local interests over 13 million.

Portable Metal Runways Serve R.A.F. in Battle

Rolls of wire mesh 75 ft. long and 10 ft. wide are the raw material of portable metal runways laid down by England's Royal Air Force when concrete runways are not available. Construction of these provisional runways falls into three parts. Part one consists of the rolling out of the wire mesh, which is reinforced by mild steel rods that run through the whole width of the mesh at intervals of 6 to 7 in. Next the overturned ends of the reinforcing rods of the adjoining lengths of the wire mesh are linked together by narrow strips of steel. Lastly, angle-iron locating pins are driven into the ground with 28-lb. sledge hammers while a special grapple hooked to a tractor keeps the track in tension.

Normally a runway is built 150 ft. or 15 rolls wide and 3,000 to 6,750 ft. long. Between 600 and 1,300 rolls are required for portable runways of this size, and 300 men can work on it at the same time without hindering each other.

The wire-mesh runways were developed from desert roadways of similar construction used in Palestine during the last war. They give effective service for a long time, even for use by heavy modern bombers.

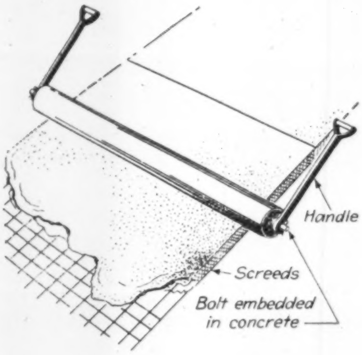
From Field and Office

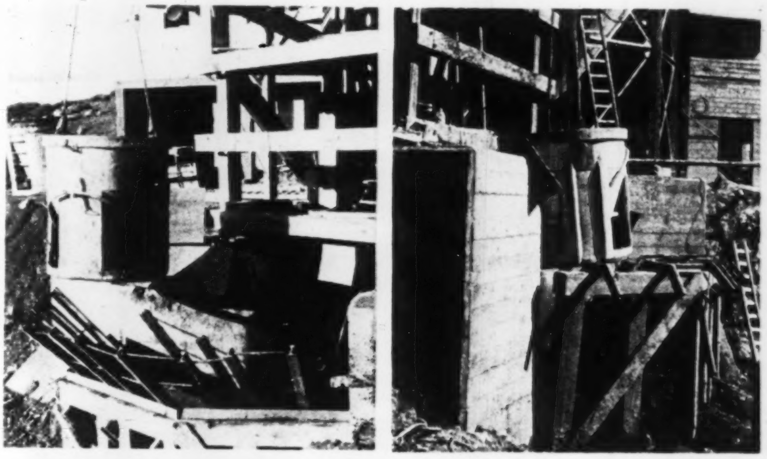
WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRACTORS

ROLLER STRIKE-OFF

A roller strike-off made from a 4-in. dia. pipe, filled with concrete, has been substituted for the conventional wood screed for leveling concrete on a naval warehouse floor. The roller has a bolt imbedded in the concrete at each end to hold a short handle for manual operation. It rides on screed strips set to the finished concrete level and pushes excess concrete ahead of it.

Two men operate the roller, doing a job that required seven workers when the conventional wood-screed was skidded along the forms. Brann & Stuart Co., the contractor, developed the device.





A concrete bucket, suspended from the cableway, descends toward the inclined rails that guide it to loading position. First design, at left, was changed to that shown in right view to eliminate damage to bucket.

Rails Guide Concrete Buckets

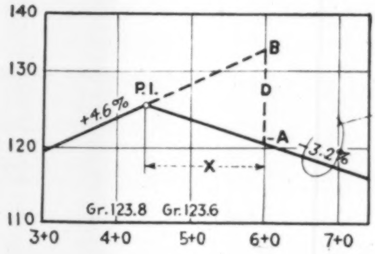
At Keswick Dam, under construction in California on the Sacramento River below Shasta Dam, the concrete mixing plant is built on the edge of a bluff. Despite an extension on the chute delivering concrete from the mixer, it was difficult to get the buckets, that move on a cableway, accurately placed in position for loading. An effective remedy was found in an inclined grillage of railroad rails so arranged that when the bucket comes down, the rails guide it to just the right spot.

The ends of the rails which, in the left picture project upward toward the bucket, were later burned off as a means of protecting the bucket against damage in "near misses." The portions removed then were welded on again in a horizontal position with outer ends turned slightly downward, as illustrated in the photograph reproduced at the right.

Keswick Dam is being built for the U. S. Bureau of Reclamation by the Guy F. Atkinson Co. and the W. E. Kier Construction Co., general contractors.

Solving for the Station of Point of Intersection

A method of determining the exact stationing of the point of intersection of horizontal grades and eliminating the necessity of showing gradients in indefinite parts of a unit is illustrated by the accompanying typical profile. The writer has used the method in his engineering practice for the past 20 years and has not seen it published in any form in engineering text books.



Referring to the diagram: *A* is the elevation of established grade; *B* is the elevation of the adjacent grade extended opposite *A*; *D* is the difference in elevations; *G* is difference of gradients; *X* is the distance in stations. Then, in the example:

$$D = B - A = 133 - 120.4 = 12.6$$

$$G = +4.6 - (-3.2) = 4.6 + 3.2 = 7.8$$

$$X = \frac{D}{G} = \frac{12.6}{7.8} = 1.615 \text{ stations}$$

$$X = (6 + 00) - (1 + 61.5) = (4 + 38.5) = \text{the station of the point of intersection.}$$

—C. A. HELM, *Railway Draftsman, Office Chief of Engineers, War Department, Washington, D. C.*

Oil of Eucalyptus Subs For Creosote in Piles

Under the emergency of wartime shortage that has made creosoted piles extremely hard to get, straight poles cut from eucalyptus trees have been used as a substitute on the West Coast. The natural oil in the eucalyptus wood makes it highly resistant to marine borers. The wood is hard and is available all along the California coast in lengths adequate for most pile jobs.

The major difficulty is in the tendency of this wood to bend, twist and check in the seasoning process. To combat these tendencies the most effective treatment thus far found has been to seal both ends of each pile with a heavy paint coat. Anything that excludes air and prevents moisture escape will do. By thus protecting the pile end and avoiding keeping it in storage any longer than necessary, fairly satisfactory results are reported.

Deflections of Continuous Steel-Beam Highway Bridges

Rapid and reasonably accurate approximation of the deflections for various types of continuous steel girders under uniform dead load is possible with the accompanying charts, which are especially applicable to highway bridges of 15-ton capacity. It is not to be presumed that the graphs can take the place of a detailed mathematical investigation for any particular case. Rather, they should serve as a means of judging the results of precise and involved calculations when time does not permit an extended, detailed checking. The charts are useful in estimating the probable dead-load deflection while the design problem is still in the preliminary stages.

Consideration of the basic elements of deflection for any given span, the beam being uniformly loaded, indicates that the deflection will vary directly with the uniform dead load, inversely with the moment of inertia, and according to the fourth power of the span. Or, as a formula, the deflection will vary as $K \frac{\omega L^4}{10{,}000{,}000\, I}$, where the constant K depends upon the location within the span, changes in the external moment along the beam, and the variation in the moment of inertia. When estimating the probable deflection, the average dead load ω expressed in pounds per foot can be closely approximated, the span length L in feet is known, and the size of the girder fairly well determined, so that the moment of inertia I can be evaluated. There remains only the evaluation of K.

This constant depends upon the arrangement of the various adjacent span lengths, and variation of the moment of inertia along the girder. A general solution is ruled out, since an infinite number of combinations is possible, but design trends, as dictated by specification and economy, lead to distinct forms and characteristic proportions. Except for special and irregular layouts, these constitute the bulk of practice.

The result of an investigation of certain types is set forth by the accompanying curves. For facility in use, and in order to give a practical working conception of deflection magnitude, the charts are shown in terms of definite numerical data.

For continuous, steel-beam highway bridges of 15-ton capacity, concrete floor and 40 to 120-ft. spans, the dead load will vary from 500 to 2,000 lb. per lin. ft., and a 36-in., *WF* beam weighing 150 lb. per ft. with a moment of inertia of 9,012 in.^{4} is a common enough section. Therefore, all results have been reduced to a common basis, as follows: a 100-ft. span; a uniform dead load of 1,000 lb. per lin. ft.; and a moment of inertia near the center of the span of 10,000 in.^{4}

To use the curves, it is merely necessary to substitute in the formula Deflection $= K \frac{\omega L^4}{10{,}000{,}000\, I}$, where K is the deflection constant for any given point along the beam as read from the curves. The deflection will be in feet. The quantity $\frac{\omega L^4}{10{,}000{,}000}$ should be computed for each span if the fundamental data change from span to span.

It will be noted that some of the curves are designated as "balanced spans." By this is meant a layout wherein the end span is approximately eight-tenths the interior span.

The writer feels indebted to J. R. Brown, junior engineer, who performed the major part of the extensive computation required.—T. W. **Oliver**, *Assistant Office Bridge Engineer, Kansas State Highway Commission.*

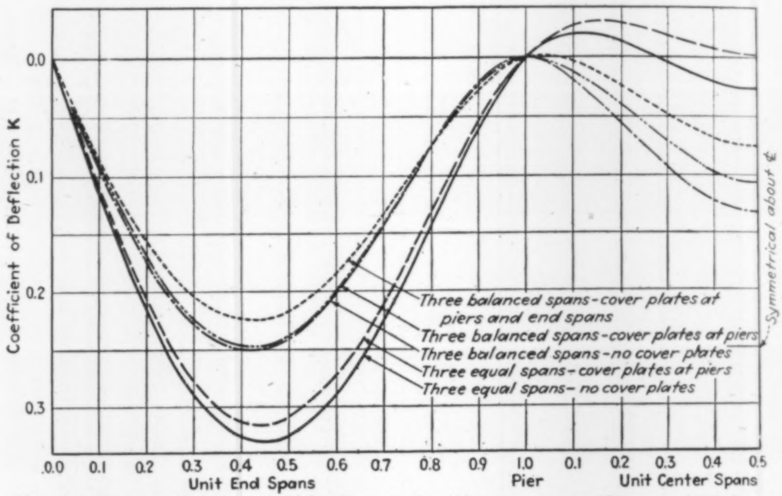


Fig. 1. The coefficient of deflection K for three-span continuous steel beam bridges is given by this chart.

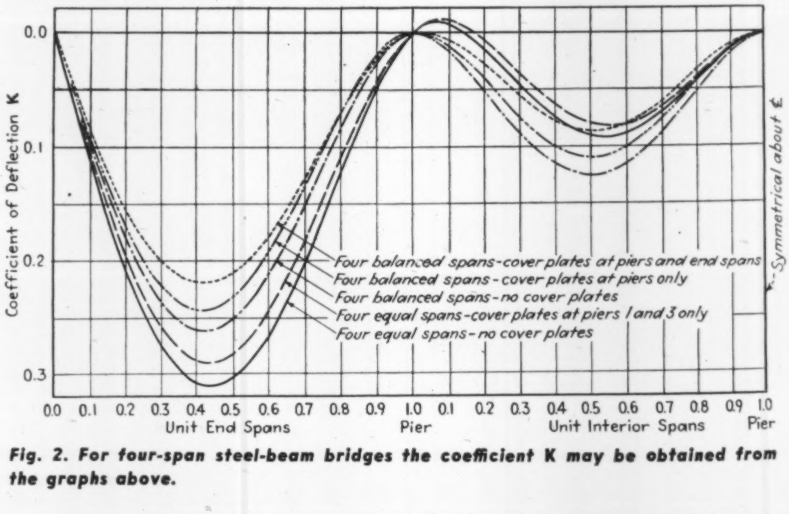


Fig. 2. For four-span steel-beam bridges the coefficient K may be obtained from the graphs above.

Book Notes and Reviews

The month's addition to the engineer's reading and reference list

• Camouflage for Industry

Industrial Camouflage Manual—By Konrad F. Wittmann, Pratt Institute. 128 pp. Reinhold Publishing Corp., New York. $4.

Chiefly by diagrams and offset reproductions of photographs, this book sets forth the basic principles that must be applied to the camouflage of industrial plants. It is the outgrowth of the work of the staff of the Art School at Pratt Institute to develop a course in industrial camouflage. Like most texts on camouflage, this manual has the defect of assuming that effects that can be produced with models can be reproduced in real life, thus giving an indication that much more can be accomplished in actual camouflage operations than will be found to be the case. Despite this weakness, it is by far the most complete and useful text on camouflage yet published. Among its untried proposals, that of constructing umbrella-like projections from tall stacks to break the regularity of the shadows has been questioned by camouflage experts of the Army.

About Engineering

Your Career in Engineering—By Norman V. Carlisle. 253 pp. E. P. Dutton & Co., New York. $2.50.

Here is a book that should be put in the hands of every high-school student who is considering taking up engineering as a profession. It has the advantage over earlier texts, most of which were prepared by engineers, of having been written by a skilled writer of books for young people. The well-written text indicates that the author made a thorough study of his subject, drawing on material assembled by such agencies as the Engineers Council for Professional Development. The result is a very sane approach to the questions that must arise in the minds of boys who are thinking of taking up the study of engineering.

Of special value is the author's emphasis on the fact that engineering is not a romantic profession to be entered lightly, also that its rewards are measured more in satisfaction than in dollars. Throughout the several sections, stress is laid on the engineer's need for ability in mathematics; an engineering school, the author states, is no place for a student who does not excel in mathematics. Opportunities for young men in engineering who have mathematical skill and imagination are clearly set forth, yet the whole is tempered with much sound commonsense.

Industrial Waste Treatment

Industrial Waste Treatment Practice—By E. F. Eldridge. 401 pp. McGraw-Hill Book Co., New York and London. $5.

Unique in that it is the first comprehensive American text on industrial waste treatment, Prof. Eldridge's book commands attention also by virtue of the vast amount of useful information that has been brought together for the first time. Divided into 17 chapters (filling 400 pages) the book deals with the treatment of virtually all industrial wastes, and thus helps to close an awkward gap in technical literature.

This collection of data pertaining to the design and operation of treatment works for the liquid wastes from industry had its origin in a sketchy outline of practice issued in 1938 as a bulletin of the Engineering Experiment Station, Michigan State College, where the author serves as research associate. So much interest was evidenced in this bulletin, reports Prof. Eldridge, that it was soon out of stock. This led to the ambitious project of a book in which has been included all that is fundamental to industrial waste treatment along with the latest developments.

Prof. Eldridge is an acknowledged expert in this highly specialized field, and his book reflects knowledge that has been tested in practice. To lend greater usefulness to the text, particularly for those who may not be fully informed concerning present sewage disposal methods and theory, there have been included several chapters on stream pollution, standard treatment methods, structures and equipment. In addition to discussions concerning treatment of specific types of wastes there are two general chapters dealing with characteristics and analysis of wastes.

Laboratory Technique

Soil-Cement Mixtures: Laboratory Handbook—80 pp. Portland Cement Association, 33 West Grand Ave., Chicago. Limited free distribution.

Spectacular increases in the use of soil-cement mixtures as a result of the nation's greatly expanded airport construction program have brought an ever-increasing demand for basic information on which such mixtures should be designed. This pamphlet has been written to meet that need. It covers soil identification and classification and the field and laboratory techniques of designing and testing soil-cement mixtures. Also included are methods for evaluating test data, a review of soil-cement research and data on methods for modifying soils by admixtures of cement. This new handbook is designed to be a companion to "Soil-Cement Roads—Construction Handbook," issued in 1939 by the Portland Cement Association.

Looking to the Future

A Region in Upheaval—By Harry Grayson. 131 pp. Published in multigraphed form by the Engineering Division, the Detroit Edison Co., Detroit, Mich.

As an aid to planning for the most efficient development of the great industrial region centering on Detroit in the post-war period, the engineering division of the Detroit Edison Co. has made this study of the major factors that can be expected to affect that development. Factors studied were population shifts, migration of industries, health, water supply and sewage disposal, housing, recreation, government, the problems of the city, zoning and land utilization, highways, anticipated technological developments, and advance planning. Special attention was given to the probable effect on future population shifts of the large industrial plants built for war purposes and the large increase in housing built to accommodate workers in these plants. The book does not attempt to set forth any extensive conclusions. Rather, it enumerates those factors, such as the trend toward decentralization of industry, that must be considered in any attempt to shape future trends. The findings as to these factors should be of interest to those concerned with like problems in other large metropolitan areas.

Brief Notes on Materials

STRENGTH AND PROPERTIES OF MATERIALS—By John Elberfeld. 150 pp. Harper & Brothers, New York and London. $1.75.

The content of this small book hardly does justice to the comprehensive title. Actually the book is made up of a miscellaneous collection of short chapters about ferrous and non-ferrous metals and their manufacture, about alloys and plastics, with added chapters of a few pages each on riveted and welded joints, on beam and column design and on reinforced-concrete design. The author in his preface states that the book "is one of a series developed at the Rochester Athenaeum and Mechanics Institute as part of its program for developing teaching materials which are practical in nature and closely related to the actual requirements of jobs in industry." This may be true of the material relating to metal working, but insofar as the civil engineering material is concerned, it would appear that the smattering of knowledge of beam and column design that a student would obtain from such a text would serve only to give him a dangerous sense of competence in a field into which he should not venture without a much more profound knowledge of his subject.

Miscellaneous Notes on Booklets and Reprints

RECOMMENDATIONS: A PROGRAM FOR HOUSING WORKERS IN WAR INDUSTRIES is the title of a new booklet published by the National Committee on the Housing Emergency. Copies may be obtained from the committee at 512 Fifth Avenue, New York.

SOIL BUILDING BLOCKS made with emulsified asphalt were the subject of an investigation at the University of Illinois Experiment Station, Urbana, Ill., which has been reported in Bulletin No. 333, available for 45c. The title is "The Suitability of Stabilized Soil for Building Construction.

SEWAGE AND INDUSTRIAL WASTE DISPOSAL PRACTICES, discussed at the 15th annual Ohio Conference on Sewage Treatment, are available in a booklet of 150 pages. Copies are priced at $1.25 and may be obtained from W. D. Sheets, 57 Orchard Drive, Worthington, Ohio.

SPECIFICATIONS FOR ASPHALT CEMENTS, a page of general requirements, has been published by The Asphalt Institute, 801 Second Ave., New York, N. Y., as "Construction Series No. 64," to be inserted in the association's manual, "Asphalt Pocket Reference for Highway Engineers," and in the construction specifications recently issued as numbers A-1 to A-4, B-7 and B-8, and CL-1. Copies may be obtained without charge from the institute.

A SIMPLE EXPLANATION of the Milne method for step-by-step solution of ordinary differential equations on a calculating machine giving information said to be heretofore unpublished concerning the error factors of the method, is embodied in pamphlet MM-216 just issued by Marchant Calculating Machine Co., Oakland, Calif. Sample work-sheets and suggestions for application of the method to anelectric calculator are given. Sent free on request.

A MANUAL OF READY-MIXED CONCRETE has been issued by the National Ready Mixed Concrete Association, Munsey Building, Washington, D. C. The pamphlet relates in large part to questions involved in the organization of companies to manufacture and sell ready-mix concrete and equipment needed for production and distribution of such concrete. Two sections relate to methods for proportioning ready-mixed concrete and to factors other than proportioning that effect the quality of the concrete.

METHODS FOR CONSOLIDATING HIGHWAY SURFACES by admixtures of calcium chloride are covered in Bulletin No. 29 of the Calcium Chloride Association, 4145 Penobscot Building, Detroit, Mich. The bulletin is entitled "Surface Consolidation and Maintenance with Calcium Chloride." Included are brief notes on the use of calcium chloride to consolidate road bases, pavement widening and shoulder construction, in access roads to military camps, and for airport runways and flight strips. A special Bulletin No. 26 covers military roads and airport runways in more detail.

New Engineering Books

✓ STRUCTURAL THEORY—By Hale Sutherland and H. L. Bowman. Third Edition. 363 pp. John Wiley & Sons, New York. $3.75.

✓ ELEMENTARY STRUCTURAL ANALYSIS AND DESIGN—By Linton E. Grinter. 377 pp. The Macmillan Co., New York and London. $3.75.

✓ INDUSTRIAL MANAGEMENT—By Arthur G. Anderson, Merten J. Mandeville and John M. Anderson. Revision of "Industrial Engineering and Factory Management." 598 pp. The Ronald Press Co., New York. $4.50.

MOLECULAR FILMS, CYCLOTRON, AND THE NEW BIOLOGY—By Hugh S. Taylor, Irving Langmuir and Ernest O. Lawrence. 95 pp. Rutgers University Press, New Brunswick, N. J. $1.25.

MASS SPECTRA AND ISOTOPES—By F. W. Aston. 276 pp. Longmans, Green and Co., New York and London. $7.

✓ STRENGTH AND PROPERTIES OF MATERIALS—By John Elberfeld. Rochester Technical Series. 150 pp. Harper & Brothers, New York and London. $1.75.

✓ WELDING HANDBOOK—1942 Edition. 1,593 pp. American Welding Society, New York. Price to non-members—$6 in U. S. A. $6.50 elsewhere.

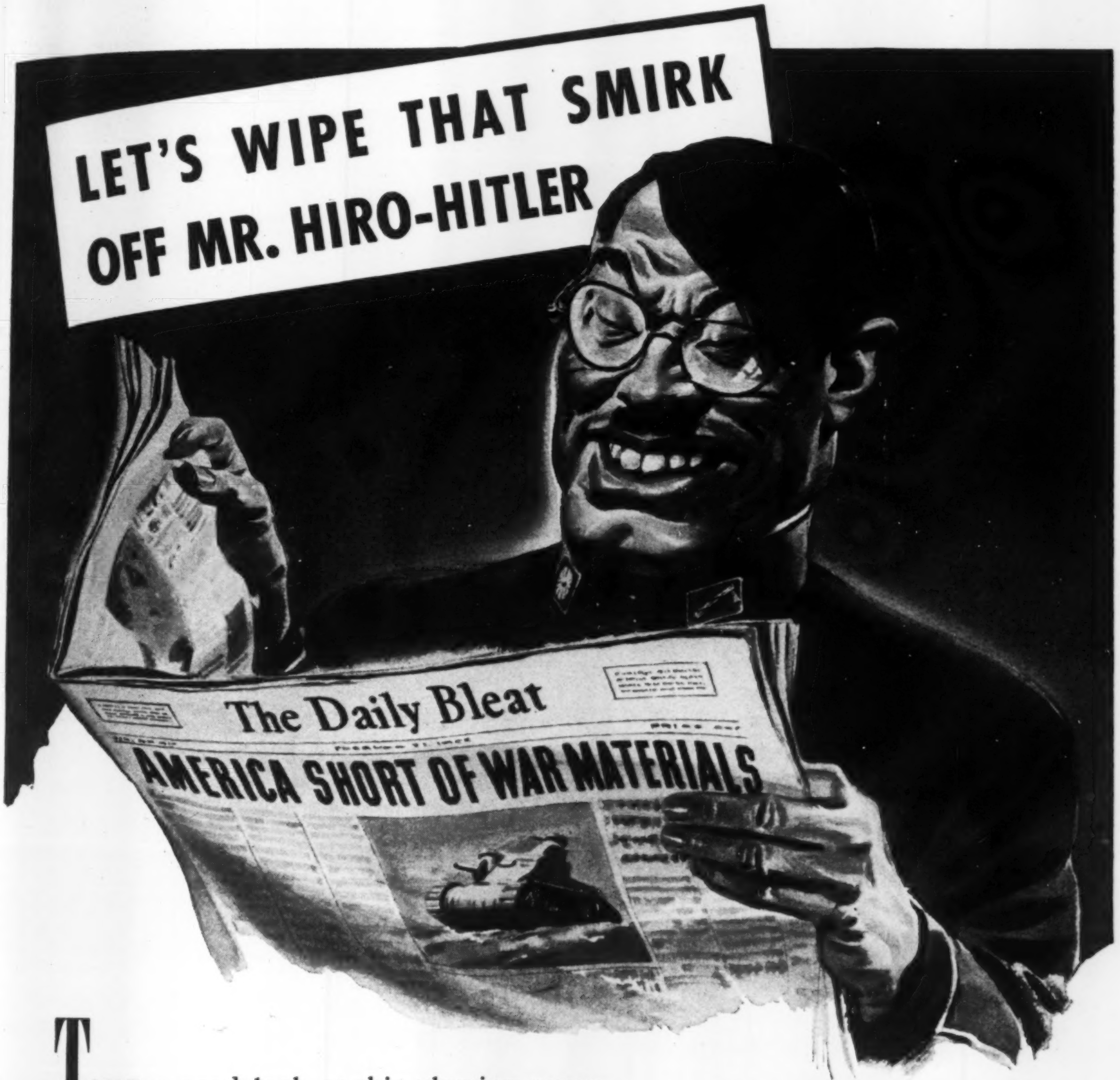
HOW TO PLAN A HOUSE—By Gilbert Townsend and J. Ralph Dalzell. 525 pp. American Technical Society, Chicago. $4.50.

TRADE AND PROFESSIONAL ASSOCIATIONS OF THE UNITED STATES—By C. J. Judkins. Superintendent of Documents, Washington, D. C. 70c.

✓ PROCEEDINGS OF THE PURDUE CONFERENCE ON SOIL MECHANICS AND ITS APPLICATIONS — Purdue University, Lafayette, Ind. (A reprint.) $4 to residents of the U. S. and $4.50 to non-residents.

NATIONAL BUILDING CODE—Prepared by the National Housing Administration and the Codes and Specifications Section of the National Research Council of Canada, Ottawa, Ontario. $1.

(*Continued on p.* 124)



TAKE a good look at this gloating scoundrel . . . our evil enemy . . . the Axis. He's smirking, but one quick way to wipe that grin from his face is by conserving the tools we use, for conservation is important to production. The Exide Batteries you use for Diesel-cranking are long-lived, dependable, and deliver high voltage quickly. But make them last longer and you're hitting the Axis. Follow these four simple rules and *Save to Win!*

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FOR CRANKING
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MAKING BATTERIES LAST HELPS STOP THE AXIS!

1. Keep adding approved water at regular intervals. Most local water is safe. Ask us if yours is safe.
2. Keep the top of the battery and battery container clean and dry at all times. This will assure maximum protection of the inner parts.
3. Keep the battery fully charged—but avoid excessive over-charge. A storage battery will last longer when charged at its proper voltage.
4. Record water additions, voltage, and gravity readings. Don't trust your memory. Write down a complete record of your battery's life history. Compare readings.

If you wish more detailed information, or have a special battery problem, don't hesitate to write to Exide. We want you to get the long-life built into every Exide Battery. Ask for booklet Form 2399.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

CLOVERLEAF BRIDGE AND HIGHWAY MARYLAND

OWNER: State Roads Commission of Maryland, Baltimore.

PROJECT: Construction of steel and concrete cloverleaf bridge, including leaves and drives, in connection with the North Point Road relocation from Moffett Avenue to the Baltimore City line, Baltimore, Md. Bridge project at intersection of North Point Road and Eastern Avenue. (Contract No. B-463-2-466). Entire project involves 1.315 miles highway construction.

CONDITIONS: Contractor to furnish all materials and complete work in 125 working days. Rail and highway transportation facilities available. Minimum wage rates are: skilled labor, 70c. per hr.; semi-skilled, 55c.; and common, 40c.

BIDS: Three bids were received in early April, 1942, ranging from the contract low of $941,115 to $1,367,619.

LIST OF BIDDERS:

1. C. J. Langenfelder & Son, Rosedale, Md. (contract)	$941,115
2. Williams Constr. Co., Middle River, Md	1,044,745
3. Frank Carozza, Baltimore, Md	1,367,619

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	L. S.	$5,000.00	$3,000.00	$30,000.00
2. Class 1 excavation	221,500 c. y.	.40	.45	.80
3. Class 2 excavation	10,200 c. y.	1.25	2.00	5.00
4. Class 5 excavation	2,100 c. y.	.80	1.00	2.50
5. Borrow excavation	378,500 c. y.	.49	.75	.80
6. Tamped fill	5,900 c. y.	.80	1.00	2.00
7. Earth shoulders	5,000 s. y.	.20	.15	.30
8. Seeding park area	685 M s. f.	8.00	10.00	15.00
9. Furn. place topsoil, 6-in.	22,600 s. y.	.35	.35	.40
10. Furn. place topsoil, 3-in	54,000 s. y.	.25	.25	.30
11. Sodding	8,200 s. y.	.30	.40	.50
12. Trim existing ditches	500 ft.	.20	.30	.50
13. Seeding and mulching	34,500 s. y.	.20	.23	.25
14. 5-in. macadam base course	7,700 s. y.	.80	.80	.80
15. 3-in. waterbound macadam sub-base	51,800 s. y.	.45	.50	.40
16. 3-in. penet. macadam sub-base	51,800 s. y.	.45	.50	.50
17. Stabilized base course	2,150 ton	2.00	1.50	2.50
18. Calcium chloride	25 ton	40.00	35.00	50.00
19. Sub-base, type 2	7,800 c. y.	1.75	2.00	2.00
20. Screenings, surf. course (slag)	200 ton	2.25	2.50	3.00
21. Screenings, surf. course for shoulder stabilization	12,850 s. y.	.38	.35	.50
22. Penet. macadam surf. crse. (X-sec. impr.)	7,700 s. y.	.70	.80	1.00
23. Bitum. material, penetration macadam	124,300 gal.	.105	.10	.15
24. 10-8-in. plain. cem. conc. pavmt. (A-reg.)	16,700 s. y.	3.20	3.20	3.50
25. 10-8-in. plain. cem. conc. pavmt. (XE-S)	600 s. y.	3.60	3.50	4.00
26. 9-9-in. plain. cem. conc. pavmt. (A-reg.)	7,200 s. y.	3.50	3.25	3.80
27. 9-9-in. plain cem. conc. pavmt. (XE-S)	300 s. y.	3.75	3.60	4.30
28. Bitum. surf. crse., spec. B	51,800 s. y.	.45	.50	.50
29. Bitum. surf. crse., spec. C	80 ton	10.00	10.00	12.00
30. Top dressing	4 ton	5.00	10.00	12.00
31. Asph. conc. base crse., spec. B	51,800 s. y.	.70	.75	.70
32. 6-in. vit. clay or conc. pipe outlets	200 l. f.	.65	.60	.70
33. 8-in. vit. clay of conc. pipe underdrain	800 l. f.	.75	.70	.80
34. 6-in. perf. vit. clay or conc. pipe underdrain	4,000 l. f.	.70	.60	.70
35. 8-in. perf. vit. clay or conc. pipe underdrain	500 l. f.	.85	.70	.80
36. 15-in. rein. concrete pipe	2,894 l. f.	1.75	1.75	2.00
37. 18-in. rein. concrete pipe	820 l. f.	2.10	2.20	2.50
38. 24-in. rein. concrete pipe	883 l. f.	3.00	3.00	4.00
39. 36-in. rein. concrete pipe	272 l. f.	5.00	6.00	7.00
40. 48-in. rein. concrete pipe	670 l. f.	9.50	9.00	12.00
41. 15-in. c.i. pipe (A. R. E. A. spec.)	20 l. f.	7.00	6.00	10.00
42. 15-in. asph. coated cor. metal pipe	365 l. f.	2.50	2.50	3.00
43. 6-in., 90-deg. pipe elbow, conc. or vit. clay	1 ea.	2.00	3.00	10.00
44. 15-in., 90-deg. rein. conc. pipe elbow	2 ea.	6.00	10.00	20.00
45. 6x8-in. vit. clay or conc. pipe tee sect	1 ea.	3.00	5.00	10.00
46. 15x24-in. rein. conc. pipe tee sect.	1 ea.	20.00	15.00	30.00
47. 15x36-in. rein. conc. pipe tee sect.	1 ea.	30.00	40.00	40.00
48. 15x48-in. rein. conc. pipe tee sect.	1 ea.	40.00	60.00	50.00
49. 11x18-in. asph. coat. cor. met. pipe (Int. B)	141 l. f.	3.00	3.00	3.50
50 25x44-in. asph. coat. cor. met. pipe (Int. B)	177 l. f.	8.50	8.00	12.00
51. Relaid pipe (any size)	100 l. f.	1.50	1.50	3.00
52. Treated Class A timber piles	7,260 l. f.	1.50	1.70	2.50
53. Test piles	40 l. f.	3.00	2.00	2.50
54. Aggregate for underdrains	375 c. y.	3.50	3.50	4.00
55. Cl. A conc. pipe endwalls (A-reg.)	95 c. y.	45.00	40.00	50.00
56. Class A concrete (A-reg.)	4,190 c. y.	30.00	30.00	40.00
57. Class B concrete (B-reg.)	50 c. y.	25.00	28.00	30.00
58. Class A conc. balustrade (A-reg.)	8 c. y.	70.00	60.00	100.00
59. Reinforcing steel bars	341,300 lb.	.06	.07	.06
60. Fabricated structural steel	881,500 lb.	.07	.06	.07
61. Stringer spirals	8,900 lb.	.32	.15	1.00
62. Damp-proofing (Sta. 387)	L. S.	1,200.00	600.00	5,000.00
63. Stone backfill	440 c. y.	4.50	4.00	10.00
64. Furn., install fiber conduits	L. S.	3,500.00	1,000.00	8,000.00
65. Expansion mat'l in bridge (Sta. 387)	L. S.	1,500.00	600.00	5,000.00
66. 5-in. plain cement conc. gutter (A-reg.)	300 s. y.	3.00	3.00	3.00
67. Comb. cement conc. curb and gutter	23,500 l. f.	1.50	1.25	2.00
68. White cem. conc. sep. curb (A-reg.)	1,500 l. f.	3.20	2.00	4.00
69. 8x18-in. plain. cem. conc. curb	1,700 l. f.	1.30	1.00	1.50
70. 5-in. concrete sidewalk	18,600 s. f.	.32	.35	.40
71. Guard rail posts	321 ea.	2.50	2.50	6.00
72. Maintenance of traffic	L. S.	2,500.00	5,000.00	20,000.00
73. Timber railing	L. S.	4,000.00	2,000.00	5,000.00
74. Manhole, over 12-ft. in height	1 ea.	250.00	500.00	400.00
75. Manhole, less than 12-ft. in height.	8 ea.	200.00	200.00	250.00
76. Removal of all buildings	L. S.	7,500.00	1,000.00	5,000.00
77. Electric lighting system	L. S.	29,100.00	28,000.00	30,000.00
78. Type E combination inlets	10 ea.	160.00	150.00	200.00
79. Type H combination inlets	20 ea.	200.00	175.00	250.00
80. Type K inlet grates	8 ea.	35.00	125.00	50.00
81. Drainage for bridge	L. S.	5,000.00	5,000.00	5,000.00
82. Cedar posts	70 ea.	4.50	3.00	5.00

HIGHWAY IMPROVEMENTS, ARIZONA

OWNER: Arizona State Highway Dept., Phoenix. W. R. Hutchins, state highway engr.

PROJECT: Highway improvements, including plant-mix bituminous surfacing of approximately 10.5 miles of the Mesa-Florence Junction Highway in Maricopa and Pinal Counties, Ariz. Project begins about 8 miles east of Mesa, and runs in easterly and southerly direction. Involves grading, draining, and aggregate base course, in addition to the bituminous surfacing.

CONDITIONS: Contractor to furnish all materials and complete work by February 15, 1943. Rail and highway transportation facilities available. Minimum wage rates specified are: skilled labor, $1.00 per hr.; semi-skilled, 68¾c.; and common, 62½c.

BIDS: Two bids were opened June 19, 1942, the contract low of $325,706, and $338,750.

LIST OF BIDDERS:

1. N. G. Hill & Co., Phoenix, Ariz. (low bidder)	$325,706
2. W. E. Hall Constr. Co., Phoenix, Ariz	338,750

Item	Quan.	Unit Prices (1)	(2)
1. Roadway excavation, unclassified	62,521 c. y.	$0.265	$0.36
2. Drainage excavation, unclassified	8,687 c. y.	.36	.36
3. Structural excavation, unclassified	2,525 c. y.	2.00	2.00
4. Removal of old concrete	81 c. y.	12.00	12.50
5. Station yard overhaul	57,696 sta. y.	.02	.02
6. Cubic yard mile haul	1,203 cy. mi.	.24	.40
7. Imported borrow (complete in place)	20,346 ton	.42	.38
8. Coarse aggregate base course (CIP)	81,016 ton	1.06	.95
9. Fine aggregate base course (CIP)	48,138 ton	1.11	1.05
10. Sprinkling (CIP)	5,957 M gal.	1.80	2.50
11. Rolling	1,939 hr.	3.50	4.20
12. Class A concrete (incl. cement)	799 c. y.	28.00	32.05
13. Class B concrete (incl. cement)	19 c. y.	28.00	31.00
14. Reinforcing steel bars (CIP)	942 lb.	.10	.12
15. Treated timber (CIP)	75 M bm.	152.00	180.00
16. Floor seal (CIP)	1,143 s. y.	.70	1.00
17. 21-in. pl. conc. pipe (CIP except excav.)	343 l. f.	3.00	2.25
18. Reset 24-in. corr. metal pipe (CIP)	110 l. f.	1.80	2.00
19. Reset 30-in. corr. met. pipe (CIP)	50 l. f.	2.10	2.00
20. Reset 36-in. corr. met. pipe (CIP)	30 l. f.	2.50	2.50
21. Reconstructing fence (CIP)	6,235 l. f.	.08	.10
22. Guide posts (CIP)	287 ea.	3.75	4.00
23. Right-of-way markers, type B (CIP)	59 ea.	4.25	4.00
24. Referenced survey monuments (CIP)	10 ea.	30.00	25.00
25. Plant mix (including haul)	15,804 ton	2.96	3.15
26. Road oil (SC-6) for plant mix (CIP in mixer)	871 ton	21.00	23.00
27. Road oil (SC-1) for prime coat (CIP on rd.)	77,462 gal.	.075	.08
28. Road oil (SC-2) for bitum. surf. trtmt. (CIP on road)	49,582 gal.	.08	.08
29. Road oil (SC-4) for bit. surf. trtmt. (CIP on road)	24,792 gal.	.09	.09
30. Placing plant mix	10.472 mi.	250.00	400.00
31. Screenings (CIP on road)	1,939 ton	3.70	4.00
32. Emulsified asph. (cl. A) for seal coat (CIP on road)	260 ton	28.00	30.00
33. Remov. conc. struct. (right of Sta. 435+84 and Sta. 542+06)	L. S.	300.00	750.00

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INDUSTRIAL EXPRESSWAYS, DETROIT, MICHIGAN

OWNER: Michigan State Highway Department, Lansing.

PROJECT: Improve 2.271 miles of Detroit Industrial Expressway from Inkster Road to West Jim Daly Road, Wayne County, Mich. Involves construction of two 24-ft. lanes of concrete pavement, 9-in. uniform in thickness. Center section must be graded as well as the roadway itself. Excavation is practically all from borrow pits.

CONDITIONS: Contractor to furnish all materials and complete work by January 1, 1943. Rail and highway transportation facilities available near site of work. Wage rates stipulated are: skilled labor, $1.50 to $1.62½ per hr.; semi-skilled, $1.00; and common, 90c.

BIDS: Two bids were opened June 24, 1942, the low of $549,933, and $565,773.

LIST OF BIDDERS:

1. Louis Garavaglia & Son, Detroit, Mich. (low bidder)	$549,933
2. Julius Porath & Son Co., Detroit, Mich	565,773

Item	Quan.	Unit Prices (1)	Unit Prices (2)
1. Clearing	7 ac.	$100.00	$100.00
2. Clearing	1 sta.	25.00	25.00
3. Grubbing	130 s. rd.	1.25	1.00
4. Remove trees 8 to 12-in. dia	4 ea.	10.00	15.00
5. Remove sidewalk	138 s. y.	.30	.25
6. Earth excavation	135,438 c. y.	.45	.35
7. Overhaul	384,729 c. y. sta.	.015	.01
8. Overhaul	67,250 c. y. mi.	.12	.12
9. Trim and finish earth grade	123 sta.	10.00	15.00
10. Grade A concrete	23 c. y.	25.00	25.00
11. 18-in. Class B culverts	256 l. f.	2.50	3.00
12. 24-in. Class B culverts	140 l. f.	4.00	5.00
13. 36-in. Class B culverts	124 l. f.	7.00	7.00
14. 48-in. Class B culverts	148 l. f.	12.00	12.00
15. 6-in. sewer with open joints	8,280 l. f.	.60	.80
16. 12-in. sewer	1,764 l. f.	1.45	1.50
17. 12-in. sewer with open joints	820 l. f.	1.40	1.25
18. Manholes, 1-A	6 ea.	100.00	100.00
19. Catch basins, 3-C	13 ea.	100.00	90.00
20. Catch basins, 6-C	8 ea.	100.00	80.00
21. Inlet, 5-C	14 ea.	90.00	80.00
22. Stone masonry	35 c. y.	10.00	15.00
23. Fine grading and clean-up	123 sta.	10.00	15.00
24. Concrete pavement, 9-in. uniform	38,081 s. y.	2.70	2.75
25. Emulsified carbon black	4,527 s. y. pavmt.	.50	.50
26. Concrete curb (det. 5-A)	12,219 l. f.	1.30	1.50
27. Topsoil surface	6,740 c. y.	.45	.50
28. Stabiized earth shouders, 6-in. mix	247 sta.	5.00	10.00
29. Shoulder borrow	2,931 c. y.	.40	.50
30. Water for wetting	8 M gal.	10.00	15.00
31. Guard posts	70 ea.	1.50	1.50
32. Sodding	6,450 s. y.	.24	.25
33. Conc. right-of-way markers	25 ea.	4.50	5.00
34. Obliterating abandoned road	1 ac.	75.00	100.00
35. Clearing	1 ac.	100.00	100.00
36. Clearing	1 sta.	25.00	25.00
37. Grubbing	229 s. rd.	1.25	1.00
38. Remove trees, 8 to 12-in. dia	31 ea.	10.00	10.00
39. Remove trees, 13 to 24-in. dia	14 ea.	20.00	20.00
40. Remove trees, 25 to 36-in. dia	3 ea.	30.00	30.00
41. Remove trees 37-in. and over in dia	1 ea.	50.00	0.00
42. Remove old culvert	1 ea.	250.00	200.00
43. Remove old pavement	15,393 s. y.	.40	.60
44. Remove sidewalk	1,352 s. y.	.20	.25
45. Remove masonry and concrete	317 c. y.	5.00	8.00
46. Earth excavation	232,561 c. y.	.45	.50
47. Shoulder borrow	1,460 c. y.	.45	.50
48. Overhaul	782,135 c. y. sta.	.015	.01
49. Overhaul	182,664 c. y. mi.	.12	.12
50. Trim and finish earth grade	56 sta.	10.00	20.00
51. Grade A concrete	23 c. y.	25.00	25.00
52. 12-in. Class A culverts	280 l. f.	1.50	1.50
53. 15-in. Class B culverts	44 l. f.	2.20	2.00
54. 18-in. Class B culverts	224 l. f.	2.50	3.00
55. 24-in Class B culverts	176 l. f.	4.00	5.00
56. 36-in. Class B culverts	312 l. f.	7.00	7.00
57. 12-in. sewer	1,698 l. f.	1.45	1.50
58. 6-in. sewer with open joints	6,550 l. f.	.60	.80
59. 12-in. sewer with open joints	1,280 l. f.	1.40	1.25
60. 15-in. sewer with open joints	910 l. f.	1.65	1.75
61. 18-in. sewer with open joints	1,200 l. f.	2.25	2.25
62. 24-in. sewer	520 l. f.	3.25	3.00
63. Manholes, 1-A	19 ea.	100.00	100.00
64. Catch basin, 3-B	4 ea.	100.00	90.00
65. Catch basin, 3-C	34 ea.	100.00	90.00
66. Catch basin, 3-E	1 ea.	100.00	90.00
67. Inlets, 5-C	8 ea.	80.00	80.00
68. Catch basin, 6-B	4 ea.	100.00	80.00
69. Catch basin, 6-C	27 ea.	100.00	80.00
70. Adjust catch basin covers	1 ea.	25.00	10.00
71. Stone masonry	24 c. y.	10.00	15.00
72. Fine grading and clean-up	56 sta.	10.00	20.00
73. Conc. curb and gutter (det. 5-A)	7,926 l. f.	1.30	1.50
74. Conc. curb and gutter (det. 7-A)	9,675 l. f.	1.35	1.50
75. Conc. curb and gutter, special	1,250 l. f.	1.30	1.50
76. Concrete pavement, 9-in. uniform	40,572 s. y.	2.70	2.75
77. Concrete end header (det. 20)	44 l. f.	1.30	1.25
78. Concrete pavement, 7-in. uniform	20 s. y.	3.00	3.00
79. Aggregate approaches (loose measure)	2,042 c. y.	2.60	2.00
80. Stabilized earth shoulders, 6-in. mix	158 sta.	5.00	10.00
81. Bituminous approach mixture	38 ton	10.00	10.00
82. Guard posts	93 ea.	1.50	1.50
83. Emulsified carbon black	4,136 s. y. pavmt.	.50	.50
84. Sodding	7,972 s. y.	.24	.25
85. Concrete right-of-way markers	17 ea.	4.50	5.00
86. Obliterating abandoned road	3 ac.	70.00	100.00
87. Water for wetting	4 M gal.	10.00	15.00
88. Topsoil surface	2,870 c. y.	.45	.50
89. Part width construction	23 sta.	50.00	200.00
90. Calcium chloride applied	2 ton	30.00	30.00

HIGHWAY AND BRIDGE MISSISSIPPI

OWNER: Mississippi State Highway Commission. Jackson.

PROJECT: Grading, drainage structures, bridges and asphalt surfacing 11.353 miles of the Aberdeen-Columbus Highway in Monroe and Lowndes Counties, Miss. This access roadway has width of 30-ft., 20-ft. of which is surfaced with asphalt. Bridge length 0.226 miles. Thickness of roadway surfacing at center is 4-in.; and at sides, 4-in.

CONDITIONS: Contractor to furnish all materials and complete work in 210 working days. Rail and highway transportation facilities available. Wage rates specified are: skilled labor, 75c. per hr.; semi-skilled, 40c.; and common labor, 30c. Project has high priority rating.

BIDS: Three bids were opened June 9, 1942, ranging from the contract low of $664.121 to $683.257. Bids were originally taken on May 26, 1942, but were rejected, and job was readvertised.

LIST OF BIDDERS:

1. Trinidad Asphalt Mfg. Co., St. Louis, Mo. (contract)	$664.121
2. W. G. Cook, Jackson, Miss	674,644
3. Chandler Bros., Inc., Virgilina, Va	683,257

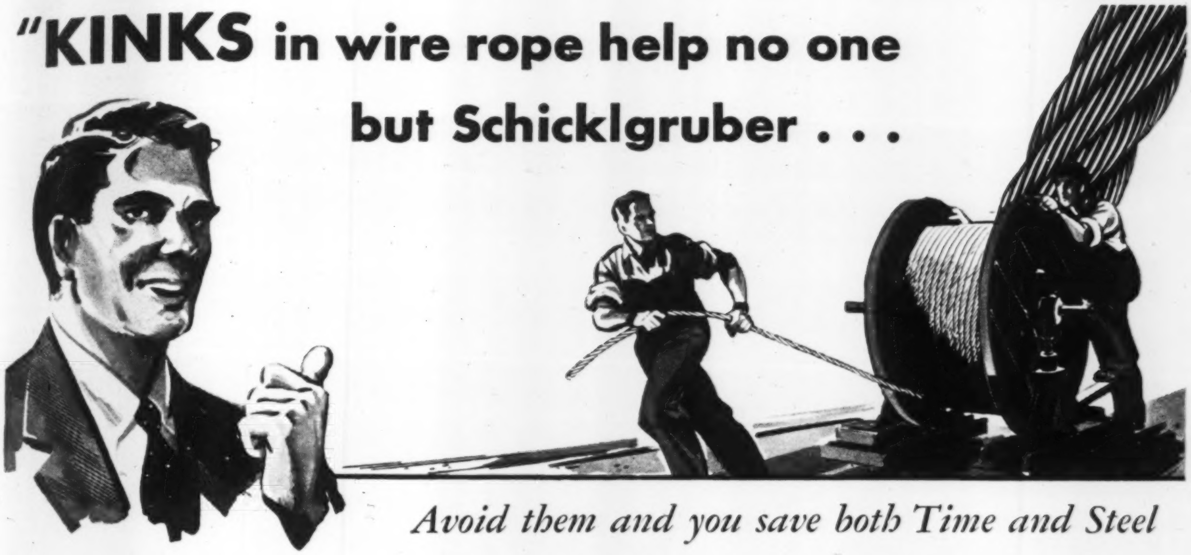
Roadway

Item	Quan.	Unit Prices (1)	Unit Prices (2)	Unit Prices (3)
1. Clearing and grubbing	L.S.	$15,000.00	$10,000.00	$16,000.00
2. Random clearing and grubbing	29 ac.	150.00	150.00	150.00
3. Remove asphaltic pavement	2,398 s.y.	.40	.30	.40
4. Dynamite	6,280 lb.	.30	.40	.35
5. Unclassified excavation	335,536 c.y.	.32	.35	.37
6. Haul of excavation	5,388,328 sta.y.	.0025	.0025	.0025
7. Haul of excavation (c.y.½-mi.)	215,393 units	.04	.05	.05
8. Haul of selected mat'l. (c.y. ½-mi.)	299,439 units	.04	.05	.05
9. Roadbed topping	93,339 c.y.	.34	.35	.40
10. Clay gravel base course	145,969 s.y.	.45	.40	.30
11. Mulching	438,878 s.y.	.035	.03	.035
12. Sprigging	517,215 s.y.	.03	.03	.04
13. Solid sodding	10,750 s.y.	.30	.30	.35
14. Commercial fertilizer (4:8:4)	42.94 ton	50.00	60.00	50.00
15. 18-in. pipe culvert (alt. 1)	510 l.f.	3.00	3.00	2.80
16. 24-in. pipe culvert (alt. 1)	435 l.f.	4.00	4.00	4.00
17. 30-in. pipe culvert (alt. 1)	216 l.f.	5.50	6.00	6.00
18. 15-in. pipe culvert (alt. 1)	186 l.f.	2.00	2.00	2.00
19. 18-in. pipe culvert (alt. 1)	159 l.f.	2.50	2.50	2.50
20. Gratings	548 lb.	.30	.30	.30
21. Class B culvert concrete	597.13 c.y.	32.00	30.00	29.00
22. Class B struct. concrete	5.79 c.y.	40.00	35.00	30.00
23. Mod. asph. conc. base crse	135,313 s.y.	.70	.75	.70
24. Type A mod. sand asph. surf. course	135,313 s.y.	.48	.50	.59
25. Tar for prime coat	43,300 gal.	.17	.16	.17
26. Extra asphalt cement	300 ton	1.00	8.00	5.00
27. Concrete header	160 l.f.	1.00	1.00	1.25
28. Rein. cem. conc. bridge end pavmt	322 s.y.	5.00	7.00	6.00
29. Reflectorized warning signs	L.S.	250.00	500.00	400.00
30. Cold lay bitum. conc. RR crossing	L.S.	590.53	500.00	346.38
31. Reinforcing steel	88,528 lb.	.07	.07	.06
32. Reset right-of-way markers	5 ea.	2.00	2.00	1.50
33. Right-of-way markers	147 ea.	2.00	2.50	2.50
34. Rt-of-w. markers (easements)	100 ea.	2.00	2.50	2.50

Bridges

Item	Quan.	Unit Prices (1)	Unit Prices (2)	Unit Prices (3)
35. Bridge excavation	350 c.y.	5.00	10.00	8.00
36. Gravel surf. crse. (clay gravel ballast)	0.66 c.y.	5.00	4.00	5.00
37. Class B bridge concrete	1,357.6 c.y.	35.00	32.50	33.00
38. Class C bridge concrete	165.3 c.y.	50.00	37.50	37.50
39. Seal concrete	97.2 c.y.	25.00	25.00	30.50
40. Structural steel	77,610 lb.	.09	.10	.09
41. Steel superstructure	L.S.	19,000.00	20,000.00	18,000.00
42. Treated timber	11.189 Mbm.	250.00	200.00	200.00
43. Reinforcing steel	341,130 lb.	.07	.07	.07
44. Railing	2,100 l.f.	4.00	4.00	3.00
45. Untreated timber piling	2,400 l.f.	1.50	1.00	1.00
46. Treated timber piling	752 l.f.	2.00	2.00	2.00
47. Precast concrete piling	6,975 l.f.	4.50	4.50	4.50
48. Timber trestle	L.S.	955.85	1,200.00	1,200.00
49. Test piles (concrete)	11 ea.	200.00	250.00	250.00
50. Loading tests	6 ea.	150.00	150.00	150.00
51. Concrete slope paving	155 c.y.	25.00	25.00	25.00

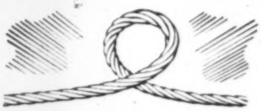
"KINKS in wire rope help no one but Schicklgruber . . .



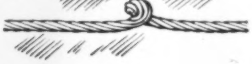
Avoid them and you save both Time and Steel

To the experienced wire rope user it may sound trite to say wire rope is a costly machine and must be treated as such. But there may be young fellows under you handling Roebling rope today who haven't learned by experience, and it's up to you to see that nothing they do will waste the valuable time and rope steel so vitally needed. Unloading the reel is just one way that a beginner may damage a rope. So tell him first that a reel of rope, like a motor or other piece of valuable equipment, should be handled carefully and not dropped from a truck or platform. Nor should it ever be moved by ***prying against*** the coiled rope.

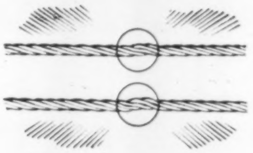
But it's in kinking that the most serious damage is likely to occur. A kink starts as a loop like this!



If it gets pulled tight, the damage has been done. The uniform relative position of the strands and wires has been disturbed—causing unequal stress distribution and abrasive wear that brings early failure at this point when the rope is put to work.

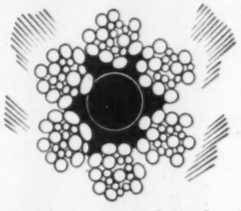


Even though you think you've straightened out a kink, looseness and high strands will appear. Because as the rope straightens after kinking, an extra twist is thrown into the strands that can never be removed. Here's a kinked rope under 10,000 pounds tension, and below it the same rope after the tension had been relieved . . .

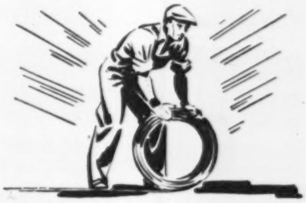


But notice that the kink remains. That means very severe abrasive wear on the high strands and abusive strain on the drawn strands since they carry more than their share of the load. To show you what happens to the drawn strands inside the rope, here is one cut through at the kinked section.

Notice how the hemp center is compressed; some strands are drawn in and others forced out.



All right, kinks are wasteful . . . but it's just as easy to avoid them as it is to put them in. Remember, kinks start as loops—caused in most cases by taking rope from a stationary reel or coil. *The remedy is simple*—always unwind wire rope straight ahead by rotating the reel or coil. Don't let the reel get going faster than your rope is coming off. Always keep some tension on the rope if at all possible. Most people put a shaft through the center of the reel and jack it up—as shown in the big illustration at top. If it's in a coil, simply roll it along the floor like this . . .



It's as easy as that to avoid kinking during installation (where most kinks occur). Have these rules followed by every man who handles it, and you'll be on the way to getting all the *extra* service that's built into every inch of wire rope that bears the Roebling trademark."

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY
Branches and Warehouses in Principal Cities

★ PROMPT SERVICE
★ on essential orders from warehouse
★ stocks or mill

ROEBLING
"Blue Center"
STEEL WIRE ROPE
PREFORMED OR NON-PREFORMED

MATERIALS AND LABOR PRICES

Market quotations on construction materials and wage rates reported monthly by ENR correspondents

WAGE RATES provide the most important change in the construction material and labor price list for August. In Boston the range that formerly prevailed between union and non-union rates has been closed up, with the higher union rates now in effect. The new Boston wages are: bricklayers, $1.625; carpenters, $1.50; structural ironworkers, $1.65; hoisting engineers, $1.875; and plasterers, $1.667. Chicago building trade rates are 5c. higher for bricklayers and hoisting engineers; up 7½c. for carpenters and common laborers; and up 6c. for structural ironworkers. Dallas wages are 25c. higher for carpenters and structural ironworkers; up 12½c. for bricklayers and plasterers; and they also climbed for hoisting engineers and common laborers.

Common labor rose 10c. per hour in Detroit, and 5c. in New Orleans. Bricklayers', carpenters' and hoisting engineers' rates are up in Detroit. The Los Angeles wage rate for carpenters increased from $1.175 to $1.50.

Structural clay building tile prices increased in Baltimore, Chicago and Dallas, but were off in Detroit. A minor gain was recorded in Douglas fir in Baltimore, but this was offset by a decline of $1.00 to $2.50 in San Francisco.

CEMENT, AGGREGATES, READY-MIXED CONCRETE—F.O.B. CITY

	PORTLAND CEMENT Per bbl., carload lots, including 40c per bbl. for bags, cash discount not deducted			SAND AND GRAVEL Per ton, carload lots			CRUSHED STONE Per ton, carload lots		CRUSHED SLAG Per ton, carload lots, f.o.b. plant		CONCRETE Ready Mixed 1:2:4, 50 c.y. or more, delivered
	Cloth Bags a	Paper Bags	Bulk	Gravel, 1½ in.	Gravel, ¾ in.	Sand	1½ in.	¾ in.	1½ in.	¾ in.	
Atlanta	$2.77	$2.52	$2.47	$1.79	$1.89	$1.99	$1.79	$1.89	$1.59	$1.69	$8.04
Baltimore	2.36	2.11	1.91	1.75‡	1.75‡	1.25‡	1.75‡	1.75‡	1.75‡	1.75‡	7.25
Birmingham	2.50	2.25	....	1.75	1.75	1.50	.85	1.00	.90	1.15	5.80
Boston	2.75b	2.50b	2.30	1.40‡	1.40‡	1.00‡	1.40‡	1.40‡	....	....	7.25m
Chicago	2.70	2.45	2.30	2.15‡d	2.15‡d	2.15‡d	2.15‡d	2.15‡d	1.75‡	1.75‡	
Cincinnati	2.31	2.06	1.81	1.20	1.20	1.10	1.80	1.80	....	....	6.60
Cleveland	2.39	2.14	....	1.50i	1.50i	1.30i	1.75i	1.75i	1.75i	1.75i	7.30i
Dallas	2.52	2.27	2.07	1.75p	2.00p	1.75p	1.69p	1.84p	....	....	6.20
Denver	3.08	2.88	....	1.20	1.40	.90	....	....	....	....	7.25
Detroit	2.40	2.15	1.95	2.25	2.00	1.10	2.25	2.25	2.00‡	2.00‡	6.50
Kansas City	2.58	2.33	2.18	1.85	2.30	1.00	1.91	1.91	....	....	7.50n
Los Angeles	2.80v	2.20v	....	1.20	1.20	1.15	1.20f	1.20f	....	....	6.65
Minneapolis	2.90	2.65	....	1.00h	1.00h	.25h	1.00h	1.00h	....	....	7.35j
Montreal	....	1.90rs	1.79rs	....	....	1.25‡t	.85‡ct	1.00‡ct	....	....	7.25ls
New Orleans	2.41	2.16	1.96	1.65	1.65	.90	....	....	....	....	9.25
New York	2.60‡	2.35‡	....	1.60de	1.60de	.90de	1.70de	1.80de	....	....	7.25k
Philadelphia	2.32	2.07	1.87	1.55‡	1.65‡	1.20‡	1.90	1.95	1.10	1.10	8.20
Pittsburgh	2.44	2.19	1.99	1.40‡	1.40‡	1.70‡	2.25‡	2.25‡	1.50	1.50	8.25
St. Louis	2.80	2.52	....	1.50‡	1.50‡	1.25/1.50‡	1.10h	1.10h	.75g	.75g	8.00
San Francisco	....u	2.21	1.81	1.36	1.36	1.36	1.46	1.46	....	....	7.55
Seattle	2.95o	2.75o	....	1.00o	1.00o	1.00o	2.00o	2.00o	....	....	7.25

‡ Delivered. *a* 10c. allowed for each returnable bag. *b* 10c. per bbl. off for cash. *c* Plus municipal tax. *d* Per cu. yd. *e* Barge lots alongside docks. *f* Crushed granite. *g* F.o.b. Granite City, Ill. *h* F.o.b. plant. *i* Within three miles of Public Square. *j* 5% discount for cash. *k* Discount of 25c per. c. y. *l* Up to 200 cu. yd. *m* 50c. off for cash *n* 25 c.y. or more. *o* 2% off for cash. *p* 10c. per ton off, cash 15 days. *r* 10c. per bbl. off, cash 20 days. *s* 8% sales tax included. *t* 8% sales tax not included. *u*. Price withdrawn. *v* 20c. per bbl. discount; 20c. allowed for returnable cloth bag.

CASH DISCOUNTS CEMENT to Contractors: truck delivery, 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash discount 10c. per bbl for payment within 15 days of date of invoice. Subject discount 10c. per bbl. 20 days in Montreal.

CURRENT MAXIMUM PRICES RECEIVED AT CEMENT MILL

Charge for bags not included. For cloth bags, add 40c. per bbl.; 10c. refund allowed for each returnable bag; for paper bags add 15c. per bbl., not refundable.

	Bagged	Bulk		Bagged	Bulk		Bagged	Bulk
Buffington, Ind	$1.70	$1.65	Ironton, Ohio	$1.60	$1.55	Richard City, Tenn	$1.80	$1.75
Dallas, Tex. (Inc. 10c. tax)	1.85	1.80	Limedale, Ind	1.70	1.65	Steelton, Minn	1.80	1.75
Hannibal, Mo	1.70	1.65	Norfolk, Va	1.75	1.70	Universal, Pa	1.65	1.60
Hudson, N. Y	1.75	1.70	Northampton, Pa	1.55	1.50	Waco, Tex. (Plus 10c. tax in Tex.)	1.75	1.70
Independence, Kans	1.70	1.65	North Birmingham, Ala.	1.70	1.65	Montreal (8% sales tax incl.)	1.68	1.67

PAVING BRICK, BLOCKS, ASPHALT, ROAD OILS—F.O.B. CITY

	PAVING BRICKS AND BLOCKS			PAVING ASPHALT Per ton, less than 80 penetration		ASPHALT BINDERS—FLUXES Per gal., 80-300 penetration		CUTBACK ASPHALT Per ton		ROAD OILS Per gal.	ASPHALT EMULSION (Quick-breaking) Per gal.	
	Granite per M. lots of 50,000 4x4x8 in.	Brick per M. 3x4x8½ in. carload lots	Wood per sq. yd. 3½ in. 16-lb. treat	Tank car	Drums	Tank car	Drums	Tank car	Drums	Tank car	Tank car	Drums
Atlanta	$73.00	$39.35	$2.25	$18.40e	$24.62e	$0.0787e	$0.1309e	$0.0826he	$0.1348h	$0.0676e	$0.0826	$0.1348
Baltimore	150.00‡	45.00‡	3.00	15.00	21.00	.06	.09	13.00	23.00	.065	.07	.14
Birmingham	......	32.00j	....	17.95	.....†	.0747	......†	.0834h	......†	.065	.09	......†
Boston	85.00	55.00	3.75	14.00	20.00	.06	.09	.065h	.115h	.065	.09‡	.12‡
Chicago	150.00	55.00	2.20d	14.80	20.80	13.00g	18.50g	.0625h	.15h	.05	.08	.12/.14
Cincinnati	112.00	37.50	....	16.40	.....	.085	......	12.25	......	.07	.085	.....
Cleveland	110.00	38.50	2.25	20.00	25.00	.09	.155	.10h	15.00	.07	.11	.15
Dallas	......	36.00	....	13.25	20.30	.06	.11‡	16.00	24.80	.06	.05/.07	.07/.09
Denver	......	27.50	....	.....	.....	......	......	......	......	......	......	......
Detroit	......	37.50	....	15.10f	22.60f	.0725	.1262	15.10	21.10	.067	.0725	.1262
Kansas City	......	40.00	....	18.50	23.50	.077	.1075	.077h	.107h	.057	.11	.15
Los Angeles	......	50.00	....	6.50b	15.00	6.50bg	15.00bg	5.50b	......	.0192	.0525	.1125
Minneapolis	......	.....	1.87d	.....	27.70	......	.126	......	32.64	......	......	......
Montreal	......	.....	....	16.60k	24.25k	.116k	.1485k	.115hk	.135hk	.08k	.135k	.188k
New Orleans	......	.....	....	13.00a	19.00a	.055	.085	.06h	.09h	......	.078	......
New York	......	.....	....	16.40	23.50	.064	.124	.07h	.13h	.067	.0725	.1225
Philadelphia	130.00	56.50	3.96	14.00	.....	.055	......	.065h	.....	.055	.065	.....
Pittsburgh	135.00	38.75	....	.....	.....	......	......	......	......	......	......	......
St. Louis	......	37.00	....	15.00	20.00	14.00g	20.00g	.06h	.11h	.045	.09	.125
San Francisco	......	70.00	....	9.50	18.00	9.50g	18.00g	10.00	17.50	9.50g	.0525	.1125
Seattle	......	60.00c	....	9.50i	25.85	......	25.10g	10.00i	......	9.50i	.0575i	.0808i

‡ Delivered. *a* F.o.b. Baton Rouge. *b* Delivered to purchaser's warehouse. *c* 3½x4x8½ in. *d* 2½ in. 12-lb. treatment. *e* Local reduction due to 20% reduction intra-state class freight rates, only Georgia affected. *f* Mexican. *g* Per ton. *h* Per gallon. *i* F.o.b. Martinez. *j* 3x3½x8½ in. *k* Tax included. † Available on priority only and quoted specially.

"MAN-HOURS"

—the misleading measure of production

It requires but one eye to see that man-hours alone are no measure of production. The thing that counts is how much that man can produce in one hour.

ALTER EGO: Sure. By one method he may produce two or three times as much per hour as by another method.

Take arc welding. This method results in far greater effectiveness. In joining steel, one welder does the work of two, three or four men using other methods. And he does a better job with 15% to 25% less steel.

ALTER EGO: Then it would seem a better measure for a company's contribution to the war effort would be METHOD-HOURS.

True as gospel. Our whole war production has been zoomed by those who grabbed arc welding as the only way to save our national neck.

ALTER EGO: And later they'll be schooled in an art to save their individual necks when competitive production again seeks profitable markets.

THE LINCOLN ELECTRIC COMPANY
CLEVELAND, OHIO

ALTER EGO: Literally, "one's other self"—the still, small voice that questions, inspires and corrects our conscious action.

then I said to myself—
IT'S METHOD-HOURS THAT COUNT!

IRON AND STEEL PRODUCTS—BASE MILL PRICES

	STRUCT. SHAPES-PLATE	REINF. BARS ¾-in. billet *b*	RIVETS ¾-in. structural	WIRE NAILS Base *d*	SHEET PILING Base	STEEL RAILS Per Gross Ton Standard	Light	Re-rolled	TRACK SUPPLIES Angle Bars	Std. Spikes *c*	Tie Plates *c*	Track Bolts
Birmingham	$2.10	$2.15	$3.75	$2.55	.....	$40.00	$40.00	$39.00	$2.70	$3.00	$2.15	$4.75
Chicago	2.10	2.15	3.75	2.55	$2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.75
Pittsburgh	2.10	2.15	3.75	2 55	2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.75
Buffalo	2.10	2.15	.....	.....	2.40	.....	.....	.....	.....	.....	2.15	.....
Cleveland	2.10	2.15	3.75	2.55	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown	.....	2.15	.....	.....	.....	.....	.....	.....	.....	3.00	.....	.....
Detroit	.....	2.27‡	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gulf ports	2.47*a*	2.52*a*	.....	.....	2.85*a*	.....	.....	.....	.....	.....	.....	.....
Pacific ports	2.75*a*	2.80*a*	.....	.....	2.95*a*	.....	.....	.....	.....	.....	2.30	.....

‡ Delivered. *a* F.o.b. cars dock. *b* Rail steel same as billet prices. *c* Other basing points include Portsmouth, O., Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., and Pacific coast ports, on tie plates, alone, Steelton, Pa., on spikes alone, Lebanon, Pa., Richmond, Va. *d* Add switching charge $18 per c.l.

IRON AND STEEL PRODUCTS—F.O.B. WAREHOUSE, PER 100 LB., BASE PRICE

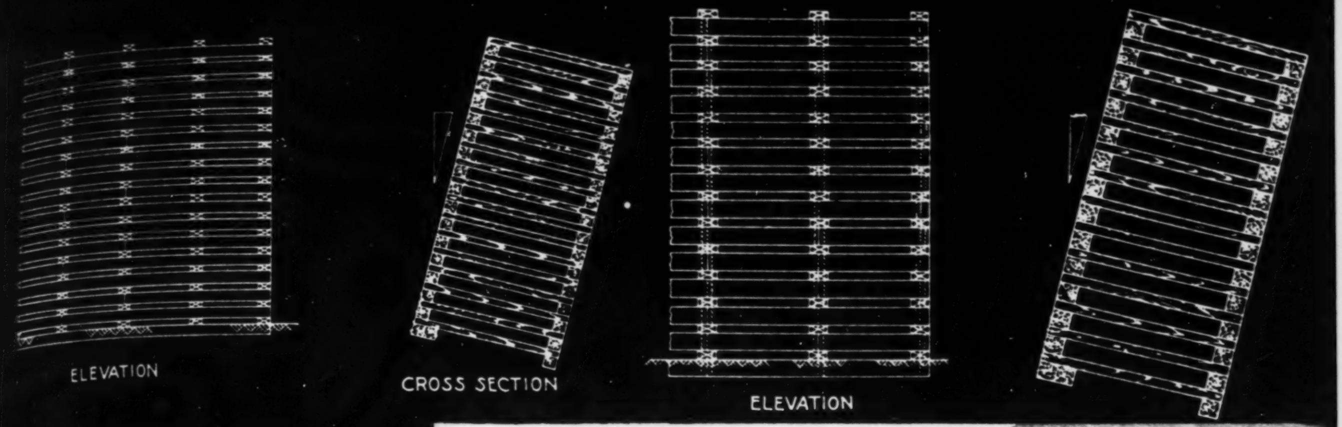
	STRUCTURAL SHAPES Per 100 lb. base price	REINFORCING BARS* Per 100 lb., ¾ in., base price 15 tons or over *b* New billet	Rail steel	Add Switch	$/cwt. for Del.	EXPANDED METAL LATH Per 100 sq.yd., carload lots Std. diamond mesh, 3.4 lb.	Std. ribbed 3.4 lb.	WELDED FABRIC REINFORCING Per 100 s.f., carload lots 4x16 in., No. 5 & 10 wires	4x12 in., No. 8 & 12 wires	6x6 in. No. 6 & 6 wires Per sq. yd.	SHEET PILING Per 100 lb. base price
Atlanta	$2.34	$2.39	$2.39	$.02½	$.10	$21.06	$23.00	$1.82	$1.35	$0.1719	$3.04
Baltimore	3.70	2.90	2.75	......	.10	24.00	26.00	1.70	1.27	.1611	3.00
Birmingham	2.10*a*	2.15	2.15	.02½	.10	19.00	21.00	1.80	1.34	.1701	....
Boston	3.85	3.51	3.36	$20 C.L.	.10	18.50	29.50	1.76	1.31	.1656	2.70
Chicago	2.10*a*	2.15	2.15	.03	.05	21.50	23.50	1.67	1.25	.1575	2.40
Cincinnati	3.68	2.53*cd*	2.53*cd*	......	.05	19.50	21.50	1.66	1.25	.1566	....
Cleveland	2.10*a*	2.15	2.15	.02½	.10	19.50	21.50	1.66	1.25	.1566	....
Dallas	4.25	3.17	3.17	......	.....	27.50	25.50	1.93	1.42	.1827	....
Denver	4.35	3.95	3.85	......	.....	26.50	28.50	1.97	1.45	.1863	....
Detroit	3.65‡	2.34	2.24	......	.10	23.00	25.50	1.68	1.26	.1584	2.66
Kansas City	4.00	2.64*cd*	2.64*cd*	.0	.05	19.60	23.60	1.78	1.33	.1683	2.89
Los Angeles	3.65*f*	3.32	3.32	.02½	.05	23.00	27.50	1.93	1.42	.1827	3.65
Minneapolis	3.80‡	2.75	2.75	.0	.10	25.00	27.00	1.80	1.34	.1701	2.75*d*
Montreal	3.90*i*	2.65*i*	2.65*i*	......	.....	26.00*hi*	33.00*hi*	2.56*i*	3.14*i*	.268*i*	....
New Orleans	4.40	2.52	2.52	.05	.10	21.50	23.50	1.82	1.35	.1719	2.875
New York	3.75	2.76*c*	2.76*c*	......	.15	17.50	19.50	1.76	1.32	.1665	2.74
Philadelphia	3.65	3.85	....	......	.....	19.50	21.50	1.71	1.28	.1611	2.74
Pittsburgh	2.10*a*	2.15	2.15	.02½	.10	23.00	26.50	1.59	1.20	.1503	2.40
St. Louis	3.69	2.40	2.40	.0	.05	28.00	34.00	1.69	1.27	.1602	2.70
San Francisco	4.35	2.825	.....	.02½	.10	21.00	24.50	1.93	1.42	.1827	3.85
Seattle	2.75*e*	2.50*e*	.....	......	.....	34.50	38.50	1.93	1.42	.1827	2.95*ej*.

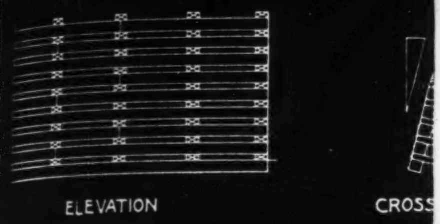
‡ Delivered. *a* Mill prices. *b* 5–15 tons, add 15c. 1–5 tons, add 25c. Less than 1 ton, add 50c. *c* 20 tons or over Base. *d* Mill price plus freight. *e* F.o.b. dock. *f* Includes delivery in free delivery zone. *g* Less than 1 ton, add 25c.; 1 to 5 tons, add 10c. * High scrap steel prices cut former 15c. differences between new billet and rail steel in many mills. *h* List price. *i* Plus Dominion and Province sales tax.

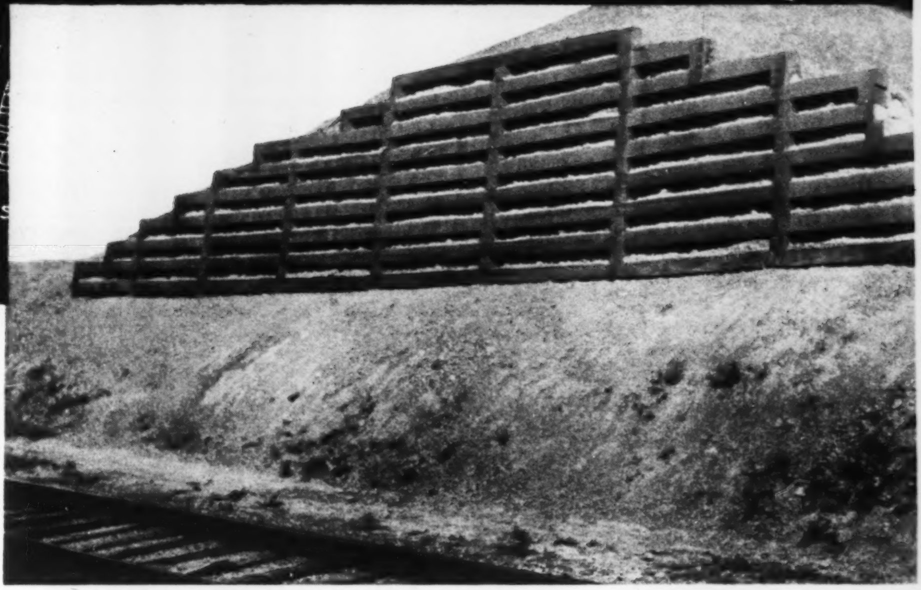
PLUMBING, HEATING, WATER, SEWER AND DRAIN PIPE

	C. I. PIPE Per net ton f.o.b. 6 in. to 24 in.*a*	VITRIFIED SEWER PIPE Per foot, std. 8 in., s.s.	delivered std. 12 in., s s.	ASTM 24 in.,	C13–35 36 in.,	CLAY DRAIN TILE Per 1,000 ft., carload lots, f.o.b. 6 in.	8 in.	CONCRETE SEWER PIPE Per ft., delivered; ASTM 12 in.	C 14–35 24 in.	WROUGHT STEEL PIPE Full standard weight, *h* 1 to 3 in., Butt Weld Black %	Galv. %	3½ to 6 in.; Lap Weld Black %	Galv. %
Atlanta	$49.40	$0.26*b*	$0.468*bc*	$1.8525	$4.68*c*	$85.00	$128.00	$0.45	$1.642	48.2	54.2	59.7	51.2
Baltimore	52.80	.36	.60	2.50	7.25	150.00	200.00	.50	1.75	65.5	57.5	63.0	54.5
Birmingham	45.00	.275	.495	1.95	5.50	100.00	220.00	.50	1.70	62.2	54.2	59.7	51.2
Boston	60.00	.26	.463	2.07	5.85	140.00	......	.70	....	64.1	56.1	61.6	53.1
Chicago	55.50	.35	.675	2.70	7.00	100.00‡	150.00‡	.45	1.85	62.2	54.2	59.7	51.2
Cincinnati	52.70	.231	.4455	1.80	5.125	105.00	170.00	.60	1.70	65.9	57.9	63.4	54.9
Cleveland	54.24	.203	.3915	1.665	5.125	81.00	125.00	.30	1.60	67.8	59.8	65.3	56.8
Dallas	58.20	.31	.55	2.25	5.00	90.00	110.00	.46	1.57	59.9	51.9	57.3	48.3
Denver	60.60	.29†	.52†	2.16†	....	130.00	240.00	....	....	58.4	50.4	55.7	47.2
Detroit	54.24	.245	.4725	1.935	5.14	82.50	131.25	.35	1.50	66.3	58.3	63.8	55.3
Kansas City	59.73	.315	.39	2.20	5.86	140.00	260.00	.45	1.60	62.9	54.9	60.0	51.5
Los Angeles	68.40	.282†	.508†	2.034†	5.085†	115.50	192.50	1.00	2.00	59.6	51.6	57.0	48.6
Minneapolis	59.00	.275†	.495†	1.98†	5.14†	......	......	.90	2.10	64.2	56.2	60.7	52.2
Montreal	60.00	.85	1.50	5.25	8.50*e*	135.00‡*l*	260.00‡*l*	.48*m*	1.92*m*	....	....	....	....
New Orleans	51.38	.26	.48	1.69	.....	150.00	220.00	.40	2.10	62.4	54.4	58.8	50.3
New York	52.20	.455	.8775	2.925	7.65	......	......	.50	1.20	64.9	56.8	62.4	53.9
Philadelphia	.....	.28	.54	2.30	6.75	150.00	225.00	.45	1.75	56.4	42.6	53.3	38.9
Pittsburgh	55.60	.245†	.4725†	1.845†	5.4325	97.80	154.20	.85*g*	2.00*g*	68.5*i*	57.5*i*	66.0*i*	54.5*i*
St. Louis	52.48	.28	.504	2.016	4.50	85.00	220.00	.90*j*	1.60*k*	56.4	42.6	52.5	38.1
San Francisco	68.40	.3625*d*	.6525*d*	2.61	6.52	115.50	192.50	.58	3.30	45.0	31.0	47.0	34.5
Seattle	70.20	.375	.675	2.70	6.75	84.00	187.50	.51*f*	1.44*f*	....	....	....	....

‡ Delivered. † F.o.b. *a* B. & S. class B and heavier, C/L lots, 200 tons and over Burlington, N.J. (base) $49.00. Based on existing freight rates; subject to rate change. Gas pipe and class A, $3 per ton additional, 4 in., $3 per ton additional, 30 in. and larger usually $2 per ton less. *b* Double strength. *c* List to dealer. *d* List. *e* 30-inch. *f* Less 5% for cash. *g* Culvert pipe. *h* Discounts from standard list consumers carload prices, except Pittsburgh prices are f.o.b. mill. Base price $200 per net ton. List prices per ft.: ½ in., 8½c.; ¾ in., 11½c.; 1 in., 17c.; 2 in., 37c.; 2½ in., 58½c.; 3 in., 76½c.; 4 in., $1.09; 6 in., $1.92. *i* Applies also at Lorain, Ohio, mills. Chicago delivered base is 2½ points less on butt, 1½ on lap. Freight is figured from Pittsburgh, Lorain, O., Chicago Dist. Billing is from point producing lowest price at destination. WROUGHT IRON PIPE: Base price and list prices per ft. same as wrought steel pipe. Discount for Pittsburgh base: Butt-weld—1 in. and 1¼ in. black 34, galv. 16; 1½ in. black 38, galv. 18½; 2 in. black 37½, galv. 18. Lapweld—2½ in. to 3½ in. black 31½, galv. 14½ in.; 4½ in. to 8 in. black, 32½ galv. 17. *j* Reinforced; spec. C 76–37. *k* Reinforced; spec. C 75–37. *l* Plus sales tax. *m* Tax included.







Making a SHORTER bridge do the job with PRESSURE-CREOSOTED CRIBBING

Short-cuts and savings take on *extra* importance today . . . and pressure-creosoted cribbing helped to make them here.

Flattening the head-of-bank to a safe angle of repose would have meant moving hundreds of cubic yards of material . . . and demanded a considerable increase in bridge span. A low-cost retaining wall of pressure-creosoted cribbing made all this unnecessary.

Many railroads and highway departments are utilizing this safe, simple, economical and *permanent* method of reducing labor and material requirements in constructing overpasses, preventing encroachment of embankments on adjoining property, holding toe of fill along highways, and similar jobs.

Pressure-creosoted cribbing can be framed to your specification, prior to pressure-creosoting. Assembly can be handled with local labor, and minimum equipment. Sectional construction can be used, with excavated material (where suitable) utilized for backfill. The completed structure is ready for use immediately; no shoring or back-work to be removed. Should future changes become necessary, material can be salvaged. Pressure-creosoting gives dependable protection against decay and termite attack.

On *your* retaining wall jobs . . . it is profitable to check up on what pressure-creosoted cribbing can do.

**WOOD PRESERVING DIVISION
KOPPERS COMPANY
PITTSBURGH · PENNSYLVANIA**

se **KOPPERS** *products*

LUMBER, TIMBER PLYWOOD—PER M FT., B.M., CARLOAD LOTS F.O.B.

	SHORT LEAF YELLOW PINE AND DOUGLAS FIR — All S. L. Y. P. is No. 2 common or better and for No. 1 N. C. Box. **(Prices in Bold Face)** *All Fir planks No. 2 common, Fir timber is No. 1 common. Lengths up to 20 ft. (Prices in italics)*									LONG LEAF Y. P. Merchantable grade up to 20 ft.		PLYWOOD Rail freight increment (See note for base price)	
	1x6 S4S	1x8 S4S	2x4 S4S	2x6 S4S	2x8 S4S	2x10 S4S	3x12 Rgh	6x12 Rgh	12x12 Rgh	2x12 Rgh	12x12 Rgh	⅝"	¾"
Atlanta	**$29.00**	**$28.00**	**$29.00**	**$27.00**	**$28.00**	**$29.50**	**$40.00**	......	......	$60.00	$70.00	$17.90	$21.85
Baltimore	**40.00**	**41.00**	**42.00**	**40.00**	**40.00**	**44.00**	**56.00**	......	......	95.00	98.00	18.25	22.25
	47.00	*47.00*	*48.00*	*48.00*	*49.00*	*52.00*	*65.00*	*$70.00*	*$75.00*	......	......	......	
Birmingham	**34.50**	**34.50**	**32.00**	**32.00**	**32.00**	**34.00**	**53.00**	**53.00**	**56.00**	......	......	17.35	21.15
[1]	37.50	37.50	37.00	37.00	37.00	43.00	65.00	......	......	67.50	70.00	......	
Boston ‡*	70.00[2]	70.00[2]	60.00[3]	60.00[3]	87.00[1]	100.00[1]	115.00[1]	......	......	115.00	130.00	18.25	22.25
‡*	*55.00*	*55.00*	*60.00*	*65.00*	*65.00*	*80.00*	*85.00*	*85.00*	*85.00*	......	......	......	
Chicago	**43.00**	**44.00**	**43.00**	**43.00**	**44.00**	**46.00**	**53.00**	......	......	90.00	100.00	14.60	17.80
	46.00	*46.00*	*46.00*	*44.00*	*46.00*	*48.00*	*50.00*	*85.00*	*85.00*	......	......	......	
Cincinnati	**41.00**	**42.50**	**39.00**	**40.50**	**42.00**	**43.00**	**53.00**	......	......	65.00	68.00	17.35	21.15
	......	......	......	......	......	......	*55.50*	*55.50*	*55.50*	......	......	......	
Cleveland	**42.50**	**43.50**	**41.50**	**43.50**	**45.00**	**47.00**	**53.00**	57.00	57.00	90.00	93.00	17.75	21.60
Dallas *e*	**39.50**	**40.50**	**39.50**	**38.00**	**38.50**	**39.50**	**53.00**	**53.00**	**53.00**	78.00	83.00	14.60	17.80
Denver ‡	54.00[4]	52.00[4]	55.00[4]	55.00[4]	55.00[4]	56.00[4]	59.00[4]	*73.00*	*79.00*	......	......	10.45	12.70
Detroit	**46.00**	**46.00**	**46.00**	**46.00**	**46.00**	**48.00**	**53.00**	......	......	53.00	61.50	17.35	21.15
	......	......	......	......	......	*51.50*	*54.00*	*60.00*	*60.00*	......	......	......	
Kansas City	**50.00**	**55.00**	**52.00**	**52.00**	**52.00**	**55.00**	**65.00**	......	......	75.00	85.00	12.60	15.40
	50.00	*55.00*	*52.00*	*52.00*	*52.00*	*55.00*	*65.00*	*80.00*	*80.00*	......	......	......	
Los Angeles *a*	*55.00*	*55.00*	*53.00*	*53.00*	*51.00*	*51.00*	*57.00*	*65.00*	*56.00*	......	......	9.90*gh*	12.05*gh*
Minneapolis ‡*b*	49.00[8]	49.00[8]	......	......	......	......	......	......	......	......	......	12.60	15.40
‡	*53.00*	*53.00*	*53.00*	*52.00*	*52.00*	*53.00*	*59.00*	*61.00*	*61.00*	......	......	......	......
Montreal †[7]	*43.00*	*46.00*	*42.00*	*45.00*	*47.00*	*54.00*	......	......	......	200.00	200.00	......	......
	42.50	*42.50*	*45.25*	*47.25*	*48.25*	*46.75*	*50.75*	*50.75*	*50.75*	......	......	......	......
New Orleans	**31.50**	**31.50**	**33.75**	**31.75**	**34.00**	**35.00**	**48.00**	......	......	69.00	69.00	14.60	17.80
	31.00	*31.00*	*33.00*	*31.00*	*34.00*	*32.00*	*33.00*	......	......	......	......	......	
New York ‡	**48.00**	**49.00**	**49.00**	**50.00**	**51.00**	**54.00**	**62.00**	......	......	120.00*f*	125.00*f*	18.35	22.25
‡	......	......	*65.00*	*65.00*	*65.00*	*65.00*	*67.50*	*75.00*	*75.00*	......	......	......	
Philadelphia	**46.00**	**47.00**	**46.00**	**46.00**	**47.00**	**50.00**	**52.00**	......	......	80.00	85.00	18.25	22.25
	54.00	*54.00*	*65.00*	*65.00*	*65.00*	*65.00*	*67.50*	*75.00*	*75.00*	......	......	......	
Pittsburgh	**50.80**	**53.20**	**62.75**	**55.00**	**60.85**	**62.50**	**76.25**	......	......	......	......	18.10	22.05
	69.20	*68.10*	*66.10*	*65.30*	*65.20*	*65.65*	*88.75*	*88.75*	*88.75*	......	......	......	......
St. Louis ‡*c*	**47.50**	**47.50**	**45.00**	**43.00**	**45.00**	**49.00**	**62.50**	*71.00*	*71.00*	79.00	70.00	14.60	17.80
San Francisco *d*	*35.50*	*35.50*	*37.00*	*37.00*	*36.50*	*36.50*	*40.50*	*49.50*	*49.50*	......	......	7.30*g*	8.90*g*
Seattle	*35.00*	*35.00*	*35.00*	*35.00*	*35.00*	*35.00*	*40.00*	*40.00*	*40.00*	......	......	0.00	0.00

Bold Face type, Southern Pine. *Italics, Douglas Fir.* [1] Long leaf. [2] Roofers' N. C. Pine. [3] Spruce. [4] Native. [6] Western Pine, No. 3 Common. [7] Spruce. [8] Norway Pine. ‡ Delivered. *a* Yard prices. *b* Contractors discount in Minneapolis and St. Paul discontinued May 21, 1938. *c* 5M ft. or less. *d* F.o.b. cars San Francisco freight rate. *e* 10% discount taken off. *f* Up to 18 ft. † Plus sales tax. * Prices for truck delivery; no longer quoting carload lots f. o. b. city.

NOTE: Special concrete form grade Fir Plywood, 4′ by 8′ panels, 5-ply, sanded 2 sides, water resistant glue, carload lots, delivered per 1,000 sq. ft. surface Seattle base price on ⅝", $86.50; on ¾", $95.30; price includes oiling and sealing charges. For other centers add rail freight increment from table or proper size. For resin dipped treatment, add $10.50 per M. *g* Lower rate by water shipment. *h* 50,000 lb. minimum.

GLASS, EXPLOSIVES, CHEMICALS

	WINDOW GLASS — Discounts from jobbers list, Aug. 15, 1938 Single or Double Thickness		EXPLOSIVES — Per lb. 40% Ammonia Gelatin in 50-lb. cases delivered in 200 lb. lots*
	A quality	B quality	
Atlanta	75%	75%	$0.15
Baltimore	79%	80%	.15
Birmingham	76%	76%	.105
Boston	77%	78%	.15
Chicago	77%	77%	.15
Cincinnati	77–10%	77–10%	.15
Cleveland	77%	77%	.19
Dallas	76%	76%	.1625
Denver	76%	76%	.155*e*
Detroit	79%	79%	.15
Kansas City	76–10%	76–10%	.155
Los Angeles	86%*d*	88%*d*	.1575
Minneapolis	76%	76%	.155
Montreal	40–5%‡	47%‡	.1675†
New Orleans	70%	75%	.16
New York	81%	82%	.22*f*
Philadelphia	78%	79%	.15
Pittsburgh	79%	79%	.1225
St. Louis	76–10%	76–10%	.155
San Francisco	66–15%	73–15%	.155
Seattle	75%	76%	.1575†

Price of 60% Ammonia Gelatin in $0.01 per lb. higher than 40%

a Disc. from list Sept. 1939. *b* Also less 6% tax exemption. *d* Discount from jobbers' list Sept. 15, 1928. ‡ Plus sales tax.

* Urban prices influenced by service charges or local storage and delivery regulations, do not consistently reflect quantity prices in less congested areas. *e* F.o.b. Louviers, Colo. *f* In boroughs of Kings, Queens and Richmond, and in Manhattan south of Canal Street, add delivery charge of $6.00 per trip. † F.o.b

40% Ammonia Gelatin price ranges in other than urban areas, per lb. (except Seismograph Grades)

	C/L 20,000 lb. net	Tons	200 lb. lots
E. of the Miss., except Fla. and Me.	$0.105	$0.13	$0.15
W. of Miss. to Rocky Mtn. States, Fla. and Maine	.11 –.1175	.135 –.1475	.155 –.1675
Rocky Mtn. States	.11 –.1225	.135 –.1525‡	.155 –.1725‡
Pacific N. W. States	.1075–.12	.1375–.15	.1575–.17
Pacific S. W. States	.1050–.1125	.135 –.1425	.155 –.1625

‡ F.o.b. Louviers, Colo., or Butte, Mont.

PILES, TIES—F.O.B.

PILES

Prices per linear foot, pine, with bark on, f.o.b. New York; delivered from barge 1½ to 2c. per ft. additional:

Dimensions	Points	Length	Short Leaf Barge	Short Leaf Rail
12 in. at butt	6 in.	30 to 50 ft.	$0.23	$0.26
12 in.— 2 ft. from butt	6 in.	50 to 59 ft.	.26	.28
12 in.— 2 ft. from butt	6 in.	60 to 69 ft.	.27	.29
14 in.— 2 ft. from butt	6 in.	50 to 69 ft.	.28	.29
14 in.— 2 ft. from butt	6 in.	70 to 79 ft.	.31	.33
14 in.— 2 ft. from butt	5 in.	80 to 85 ft.	.40	.44
14 in.— 2 ft. from butt	5 in.	85 to 89 ft.	.45	.482

RAILWAY TIES

Prices f.o.b., per tie for carload lots:		6"x8"x8′		7"x9"x8′6"	
		Untr.	Tr.	Untr.	Tr.
Boston	Oak	$1.30	....	$1.80	....
	Pine	1.60	$2.40*a*	2.40	$3.40*a*
New York	S. L. Sap Pine	1.43/1.54	2.59	1.76	2.86
	Mixed Oak	1.71	2.59	2.20	3.25
Birmingham	White Oak	1.00	1.60*a*	1.30	2.25*a*
	Southern Pine	....	....	....	....
Chicago	Red Oak	....	2.40*a*	....	3.00*a*
	Southern Pine	....	....	....	....
Los Angeles	Douglas Fir	1.10	1.75*a*	1.60	2.50*a*
Philadelphia	Red Oak	....	2.10*a*	....	3.25*a*
St. Louis	White Oak	1.65	....	1.90	....
	Red Oak	1.55	2.15*a*	1.90	2.70*a*
	Sap Pine or Cypress	1.35	....	1.70	....
San Francisco	Douglas Fir	1.15*bef*	....	....	3.00*caf*
Montreal	Birch or Maple	.85	.95	....†	....†

Tr.— Treated; Untr.— Untreated. *a* Creosoted. *b* 6" x 8 x 8′6". *c* Empty cell. *d* Zinc. *e* Green. *f* F. o. b. cars. † Out of market.

CHEMICALS

Water, sewage treatment road work, f.o.b. carlots, New York

Bleaching powder, in drums, f.o.b. works, per 100-lb	$2.25– 3.10
Chlorine cylinders, liquid, per lb. delivered	.0525
Calcium chloride, 77–80%, flaked, in 100-lb. paper bags, delivered, per ton	18.50–35.00
Silicate of soda, 52 deg., in drums, f.o.b. works, per 100 lb	1.40
Soda ash, 58%, in paper bags, per 100 lb. dense	1.15
Sulphate of aluminum, commercial, in 100-lb. bags, per ton	23.00–25.00
Sulphate of copper, in bbl., per 100-lb	5.15– 5.50

STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE — PARTITION — SCORED			STRUCTURAL CLAY TILE — LOAD BEARING — SCORED			BRICK		LIME		
	Per M. lots of 2,000 pieces or over,			Per M. lots of 2,000 pieces or over,			Per M. in quantity		Per ton,	In paper,	Carload lot,
	3x12x12 in.	4x12x12 in.	8x12x12 in.	8x12x12 in.	10x12x12 in.	12x12x12 in	Common backing	Straight hard	Hydrated finishing	Common hydrated	Pulverized or lump
Atlanta	$104.00	$114.00	$199.00	$234.00	$244.00	$244.00	$13.54	$18.04	$26.54	$15.04	$15.04
Baltimore	84.00	90.00	170.00	200.00	260.00	320.00	14.00*k*	17.00*k*	19.00	13.00	2.50*m*
Birmingham	80.00	85.00	160.00	191.00	252.00	288.00	14.50	17.00	18.11	13.64	2.25*lo*
Boston	89.35*a*	93.30*a*	178.70*a*	202.50	271.80	308.20	18.00*i*	21.00*i*	20.00	14.00	17.00
Chicago	72.00	77.00	145.00	197.00	243.00	278.00	12.50	13.50	17.00	15.00	12.50
Cincinnati	65.55	69.90	131.20	148.70	210.35	240.45	17.50	17.50	15.40	12.90	.....
Cleveland	60.00	64.00	120.00	144.00	193.00	221.00	17.00	17.00	14.50*j*	13.25*j*	3.00*jm*
Dallas	62.50	67.00	135.00	162.00	212.50	263.00	13.50*i*	15.00*i*	19.00	15.00	95*n*
Denver	84.80	94.40	152.70	178.20	212.00	227.90	13.50	17.50	30.00*j*	22.00*j*	24.00*j*
Detroit	76.90	81.50	152.80	201.00	262.00	310.00*e*	17.50	18.00	16.60	14.90	14.60
Kansas City	67.00	69.00	89.00*c*	128.00	163.00	189.00	14.50	16.50	19.32	13.00	10.92
Los Angeles	73.50†*r*	89.50†*r*	128.00*c*†*r*	210.00†*r*	368.00†*r*	460.00†*r*	13.50	15.00	16.50	17.50	17.50
Minneapolis	81.00*b*	86.40*b*	146.90*b*	......	177.00*b*	246.00*b*	13.60	15.60*g*	21.00	16.00	19.00
Montreal	72.20*au*	77.50*au*	142.50*au*	76.00*atu*	165.80*au*	248.70*u*	22.00†*u*	27.25†*u*	23.50*u*	17.00*u*	12.00*u*
New Orleans	72.00	72.00	135.00	162.00	210.00	260.00	14.00	.....	18.30	12.08	14.10
New York	78.40	83.60	115.00*c*	193.30*h*	238.80*h*	295.60*h*	14.50	.....	20.00	14.00	17.00
Philadelphia	90.00	97.70	183.20	197.10	243.20	301.10	17.00	20.00	15.50	8.55	10.55
Pittsburgh	62.35	66.55	124.75	140.25	173.25	198.00	17.50	19.50	17.90	15.40	2.55*m*
St. Louis	67.00	95.00	130.00	190.00	244.00	290.00	18.00	17.00	22.00	18.00	18.00
San Francisco	84.00	94.50	225.00	......	......	......	17.50	22.00	20.00	20.00	16.40
Seattle	105.00	115.00	210.00	......	......	......	19.50*f*	20.50*f*	20.00*s*	20.00*s*	20.00*s*

† F.o.b. *a* Smooth. *b* Carload lots delivered to job. *c* 6x12x12 in. *d* Not load bearing. *e* 48 lb. tile. *f* Less $1.00, ½ cash 15 days, balance 30 days. *g* Selected common. *h* F.o.b. Perth Amboy, N. J. *i* 50c. per M. off for cash. *j* LCL. *k* $1.00 discount if paid in 10 days. *l* Lump. *m* Per bbl., 180 lb. *n* Per sack 100 lb. *o* Per bbl., 200 lb. *p* 280 lb. bag. *r* 5% discount 10 days. *t* 5¼x8x12. *u* Plus 8% sales tax.

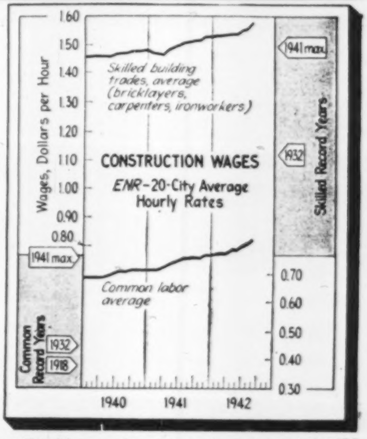
PAINT, ROOFING—F.O.B. CARLOAD LOTS

	RED LEAD	WHITE LEAD	READY-MIXED PAINT			ROOFING SUPPLIES Carload lots f.o.b. factory				
	Per 100 lb. in. 600-lb. (Approx.) bbl.	Per 100 lb.	Per gal., drums							
	Dry *a*	in oil	Graphite *b*	Aluminum *b*	Ferric Oxide *d*	Rolls, slate surfaced, 85–90 lb. per sq.	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating per gal	Tar pitch 350 lb. bbl. per ton
Atlanta	$10.25	$14.125	$1.30	$2.25	$1.20	$1.90	$1.61	$1.61	$0.27	$29.00
Baltimore	10.00	13.75	2.00	3.00	2.50	2.30	2.70	2.70	.40	30.00
Birmingham	10.25	14.125	2.35	3.50*r*	1.98*r*	2.04	1.97	1.97	.32	28.35
Boston	10.00	13.75	1.55	....	2.25	2.12‡	1.72*h*‡	1.72*h*‡	.50‡	20.00‡
Chicago	10.00	13.75	2.11	2.63	1.72	1.75*hf*	1.66*hf*	1.82*hf*	.33*f*	23.00*f*
Cincinnati	10.00	13.75	1.70	2.90	1.60	2.40	2.39*h*	2.39*h*	.36	21.00
Cleveland	10.00	13.75	2.10	4.80	1.95	1.93	1.83*h*	1.83*h*	.35	29.00
Dallas	10.00	14.50	1.88	2.11*n*	....	2.30*h*	2.25*h*	2.45*h*	.35	39.00
Denver	10.50	14.25	1.65	....	.27*l*	2.45	3.15	3.15	.35	28.00
Detroit	10.00	13.75	1.75	3.00	1.60	2.40	2.50	2.50	.35	22.00
Kansas City	10.00	13.875	2.39*g*	2.55*gr*	2.16*gn*	2.10	2.30	2.30	.28	27.50
Los Angeles	10.25	14.25	1.60	2.25	2.30	2.10	1.50	.....	.45	.....
Minneapolis	10.00	13.875	....	....	....	1.75*i*	1.66*hi*	1.66*hi*	.32	23.00
Montreal	9.25	6.25	2.40*p*	2.97*p*	2.51*p*	2.85	2.58	2.07	.63	1.85*k*
New York	10.00	13.75	2.05	2.55	1.64	1.66	1.58*h*	1.58*h*	.26	25.00
Philadelphia	10.00	13.75	....	....	....	1.75	1.66	1.66	.32	23.00
Pittsburgh	10.00	13.75	1.05	1.95	.80	1.95	1.94*h*	1.94*h*	.34	26.00
St. Louis	10.00	13.75	2.28	2.89	1.96	2.04	1.66	1.66	.31	22.00
San Francisco	10.25	14.00	1.80	2.75*n*	1.35/2.35	1.71	2.40	2.40	.33	19.50
Seattle	10.25	14.25	1.90	3.00	....	2.15	2.16*h*	....	.35	26.50*j*

‡ Delivered. Note: Red lead in oil 50c. higher than white lead in oil. *a* Red lead prices change frequently due to pig lead price changes. *b* U. S. War Dept. Spec. 3-49A. *c* ASTM Spec. D266-31. *d* 80% minimum ferric oxide. *e* Subject to 25% discount. *f* Distributors' price to contractors. *g* 5 gal. can *h* Per roll, 65 lb. *i* Minneapolis and vicinity. *j* Asphalt pitch. *k* Per 100 lb. *l* Per lb. *m* Per bbl. *n* May, 1941 price, no later quotation available. *p* Plus 8% sales tax. *r* Not available, except on priority rating; then quoted specially.

SKILLED AND COMMON WAGE RATES—PER HOUR

	Bricklayers	Carpenters	Struct. Iron Workers	Hoisting Engineers	Plasterers	Common Labor Building	Common Labor Heavy Const.
Atlanta	$1.375	$1.00	$1.375	$1.00/1.25	$1.25	$0.40	$0.50
Baltimore	1.625	1.375	1.65	1.65	1.50	.70	.70
Birmingham	1.75	1.125/1.25	1.50	1.25/1.50	1.50	.65	.65
Boston	1.625	1.50	1.65	1.875	1.667	.80/1.00	.80/1.00
Chicago	1.75	1.70	1.76	1.75	1.825	1.10	1.10
Cincinnati	1.75	1.50	1.625	1.40/1.55	1.625	.80	.80
Cleveland	1.75	1.50	1.75	1.75	1.75	1.00	1.00
Dallas	1.625	1.25	1.50	1.25/1.50	1.625	.60	.75/1.00
Denver	1.65*b*	1.43*b*	1.43*b*	1.43*b*	1.51*b*	.718*b*	.718*b*
Detroit	1.675	1.50	1.75	1.625/1.75	1.675	.90	.90
Kansas City	1.65	1.50	1.625	1.625	1.65	.90	.55
Los Angeles	1.50	1.50	1.50	1.50	1.667	.75	.75
Minneapolis	1.50	1.375	1.50	1.40	1.50*e*	.925	.925
New Orleans	1.50	1.25	1.50	1.375	1.375	.65	.65
New York	2.00*b*	1.85*b**	2.00	2.00*b*	2.00*c*	1.031	.95
Philadelphia	1.90	1.50	1.80	1.65	1.875	.825	.825
Pittsburgh	1.90	1.50	1.75	1.5625/1.625	1.75	.80	.70
St. Louis	1.75	1.50	1.75	2.00	1.75	.95	.95
San Francisco	1.75*c*	1.375	1.60	1.50	1.667*c*	.875	.875
Seattle	1.715	1.415	1.615	1.565	1.715	1.015	1.10
Montreal	.965	.855	.90	.80	.945	.505	.505



ENR Skilled Average: (Bricklayers, Carpenters, Ironworkers) **$1.585**
ENR Common Average: $0.823

b 7 hr. day. *c* 6 hr. day. *d* 35 hr. wk. *e* 30 hr. wk. *Negotiating now for increased rate.

Reports and Pamphlets

(Continued from p. 112)

Industrial Waters of Canada—By Harold A. Leverin. Report on Investigations, 1934 to 1940. Edmond Cloutier, Printer to the King's Most Excellent Majesty, Ottawa, Ont. 25c.

Recommended Practices for Inspection of Fusion Welding (Tentative)—American Welding Society, 33 West 39th St., New York, N. Y. 40c.

Lessons in Practical Arc Welding—Hobart Trade School, Inc., Troy, Ohio. 75c. per copy. Special prices to schools. *This pamphlet is Part II of Practical Arc Welding*, published by the same school. $2.

Incendiary Bombs and Fire Precautions—Air Raid Precautions Handbook No. 9. British Library of Information, 30 Rockefeller Plaza, New York. 15c.

Preventing Cutting and Welding Fires—National Fire Protection Association, 60 Batterymarch St., Boston, Mass. 10c.

Lumber Used in Manufacture — 1940. Part I—Summary Tables. Chief, Forest Service, Department of Agriculture, Washington, D. C.

Wire Rope: Its Place in War Production—Wire Rope and Strand Manufacturers Association. Shoreham Bldg., Washington, D. C.

Rules and Regulations for Real Estate Developments and Land Subdivisions Filing of Plats—New Castle County, Delaware. Regional Planning Commission, Wilmington, Del.

Federal Specification for Pipe: Clay, Sewer—Federal Standard Stock Catalog, Section IV (Part 5). Superintendent of Documents, Washington, D. C. 5c.

Maps of Seasonal Precipitation Percentage of Normal by States—Tables of Normals and 10 Wettest and 10 Driest Seasons and Years. Prepared by the U. S. Weather Bureau. Obtainable from the Superintendent of Documents, Washington, D. C.

Standard Methods for Mechanical Testing of Welds—American Welding Society, 33 West 39th St., New York. 40c.

Definitions of Welding Terms and Master Chart of Welding Processes—American Welding Society, 33 West 39th St., New York. 40c.

Economics of Water Meter Testing and Repairing—Neptune Meter Co., New York.

Alaska Highway—Hearing before a subcommittee of the Committee on Foreign Relations United States Senate. Seventy-seventh Congress. Third session on S. Res. 253. Copies may be obtained from John M. Holzworth, 832 Southern Building, Washington, D. C.

Will Electric Power Be a Bottleneck?—By Louis Marlio, The Brookings Institution, Washington, D. C. 50c.

Building Materials and Structures—Report BMS83. Strength of Sleeve Joints in Copper Tubing Made With Various Lead-Base Solders (10c.). Report BMS-82. Water Permeability of Walls Built of Masonry Units (20c.). Report BMS84. Survey of Roofing Materials in the South Central States (15c.). Obtainable from the Superintendent of Documents, Washington, D. C.

Laws Relating to Forestry Game Conservation, Flood Control and Related Subjects — Superintendent of Documents, Washington, D. C. 15c.

An Introduction of Shipbuilding—Made available by Shipbuilding Division, Bethlehem Steel Co. Superintendent of Documents, Washington, D. C. 20c.

Soil Mechanics Bulletin—Bulletin No. 15. German-English Vocabulary of Soils Terms. U. S. Waterways Experiment Station, Engineer Department, Research Centers, Vicksburg, Miss.

Moments in I-Beam Bridges—University of Illinois Bulletin Series No. 336. University of Illinois, Urbana. $1.

Depreciation of Group Ptoperties—By Robley Winfrey. Bulletin 155. 131 pp. Iowa Engineering Experiment Station, Ames, Iowa.

Soil-Cement Mixtures: Laboratory Handbook—Portland Cement Association, 33 West Grand Ave., Chicago. Limited free distribution.

Springfield, Mass.—68th Annual Report of the Board of Water Commissioners 1941.

Edmonton—Alberta, Canada. Financial Statements and Reports 1941.

Richmond, Va.—Director of Public Works Annual Report 1941.

Cambridge, Mass.—Annual Report of the City Engineer. Years ending 1939 and 1940.

Grand Rapids, Mich.—Annual report on operation of the city of the sewage treatment plant. 1941.

State of Louisiana—First progress report Department of Public Works, 1941. Baton Rouge, La.) Activities and functions of engineering, planning, housing and aeronautics in Louisiana.

Newton, Mass.—Annual Report of the City Engineer and Planning Board for 1941.

Your City Government — Schenectady, N. Y. 1941. Copies may be obtained from the office of the city clerk or the office of the city manager.

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Oil City — Freeborn Equipment Company
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San Antonio — Patten Machinery Company
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Salt Lake City — James A. Wade Company
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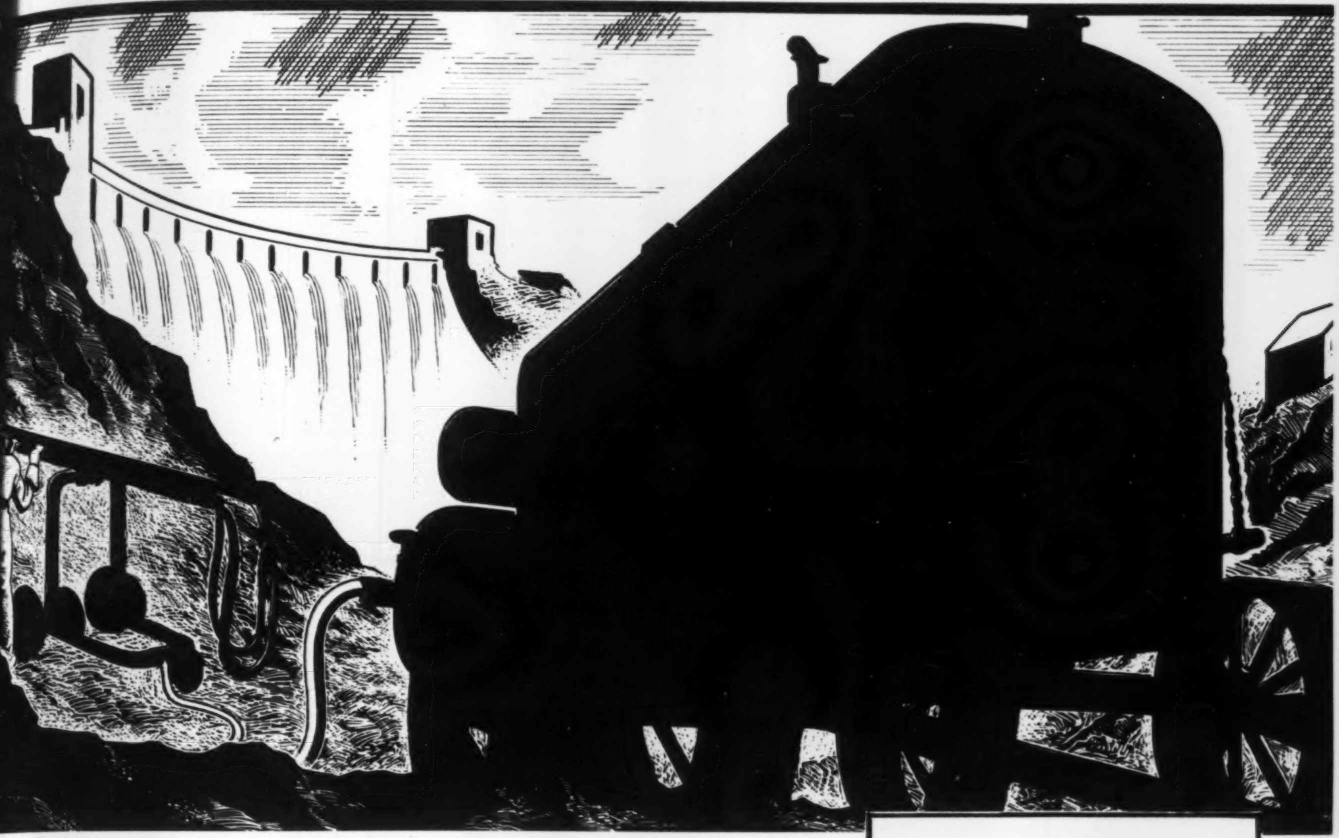
Worthington Pump and Machinery Corp.

BRUTE LUNGS, BUT NO BACK-TALK . . .



Look into the vitals of this Worthington Blue Brute Compressor and get a new angle on lung-power! All muscle, you'll say, and plenty of it. Then start it up and listen to the way it breathes!

You'll find that this Brute's smooth delivery through Worthington Feather* Valves will get your next job done more quickly, more safely, more economically—without the air-gulping "back-talk" and whining of lesser breeds.

All Worthington Blue Brutes *save air*. Blue Brute Compressors . . . portable and semi-portable, gasoline-driven, diesel or electric . . . *deliver more air* for every power-dollar you spend. And Blue Brute Air Tools *use less air* for every compression-dollar invested.

Now's the time to investigate those Blue Brute features that give you *extra* lung-power, *extra* stamina — over and above the rock-bottom fact of Blue Brutes' tip-top quality.

FREE EQUIPMENT-SAVER SPEEDS VICTORY

Save tools, time and money, by getting Worthington's new EQUIPMENT-SAVER, *complete instructions* for all tool operators. Your nearest Worthington distributor, listed on page 124, will supply you. If there is none near you, write for it direct to Holyoke.

*Reg. U. S. Pat. Off.

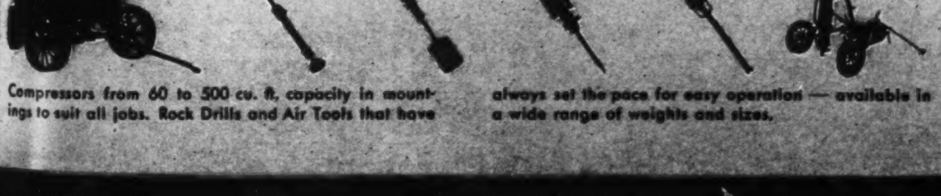
On the Job with

BLUE BRUTES

A western construction man writes: "Have sent in order for some spare parts but I think that I won't have to use them. All three BLUE BRUTE compressors that I have do not give one minute's trouble and operate as perfectly as they did when they first came on this job."

Get more WORTH *from air with* WORTHINGTON

BUY BLUE BRUTES



Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs. Rock Drills and Air Tools that have always set the pace for easy operation — available in a wide range of weights and sizes.

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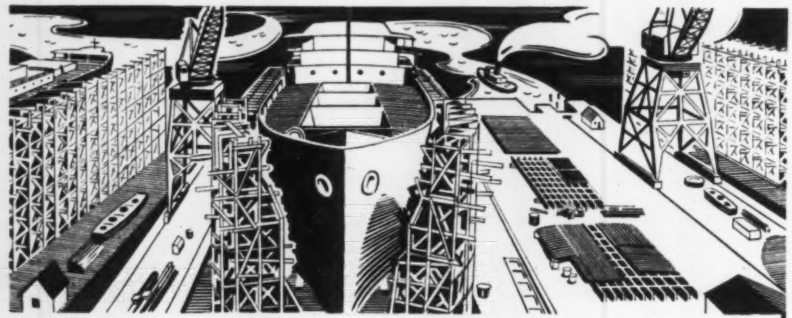
Worthington Pump and Machinery Corporation, Harrison, N. J. Holyoke Compressor and Air Tool Department, Holyoke, Massachusetts



It's Speed They Wanted, but Wood Gives Them Long Life Too

NEW SHIPYARDS have been able to get into production quickly, thanks in part to the use of wood. The ease with which wood can be worked and erected has simplified and speeded this construction. Wood was available for immediate use; no long waits for scarce materials, badly needed elsewhere for combat equipment.

*WOLMANIZED LUMBER**, employed in many of these structures, gives them long life. Vacuum-pressure impregnation with a dependable preservative makes this wood highly resistant to decay and termite attack. These shipbuilding facilities will, therefore, cost less to maintain.

SERVICE RECORDS covering a period of over fifteen years and installations of millions of feet of Wolmanized Lumber prove the economy of building with this long-lived wood. Investigations in industry's truly tough spots have shown that renewals because of decay have run less than 0.2%.

WARTIME STRUCTURES built of Wolmanized Lumber will be available for peacetime use. First costs are little more than where ordinary wood is used, and lower upkeep expense will simplify postwar financing. If you want information on how and where to use Wolmanized Lumber, write American Lumber & Treating Company, 1649 McCormick Building, Chicago, Illinois.

*Registered Trade Mark

WOLMANIZED LUMBER

ABOUT MEN

Capt. W. J. Keller, planning engineer with the Public Roads Administration at Denver, Colo., has been transferred to Fort Leonard Wood, Mo.

Clyde Williams, a recent graduate of the University of Illinois' engineering school, has succeeded **Jack Robinson** as sanitary engineer in District 10, at Springfield, for the Illinois State Department of Public Health. Robinson resigned recently to accept the post of sanitary engineer at the Sangamon Ordnance Plant.

E. L. Wittenborn, assistant sanitary engineer for the Illinois State Department of Public Health, has become sanitary engineer with the Midland Ordnance Corp., near Illiopolis, Ill.

Hoyt Fredericks, formerly a sanitary engineer with the West Virginia State Health Department, has succeeded **Chester Canhan,** sanitary engineer for District 18 at Herrin, Ill. Mr. Canhan resigned recently to enter private employment.

Maj. A. C. Bradley, army engineer in charge of construction at the Fort Worth, Tex., quartermaster depot, has been transferred to duty with the post utility division of the U. S. Engineer Office at San Antonio, Tex. He is replaced at Fort Worth by **Capt. W. H. Seaman, Jr.** The same transfer orders sent **Capt. Carl D. McQuade,** executive officer under Maj. Bradley, to Camp Walters as an area engineer and named **Lieut. G. D. Crawford,** former junior officer at the depot at Fort Worth, as executive officer.

J. C. Bisset, assistant director of public works at Dallas, Tex., resigned last month to accept a commission as a major in the Corps of Engineers.

Hugh D. Barnes, regional highway engineer of the Portland Cement Association in Pacific States for four years, and acting district engineer in charge of the Los Angeles office since September, 1941, has been appointed district engineer. He will direct the work of the association in southern California, Arizona and southeastern Nevada with headquarters in Los Angeles.

Summoned from retirement, **Lieut. Col. John A. Gilman,** of Greenville, Ky., former supervisor of Army construction, has been assigned as utilities officer to Camp Breckenridge, Morganfield, Ky.

William H. Harvie, road engineer for the Michigan State Highway Department, has been commissioned a major in the Corps of Engineers; **Olaf Stokstad,** head of

AND JOBS

the soils section of the department's research and testing division, has left the department's employ to take up civilian work with the Corps of Engineers.

Frank A. Metcalf, city engineer of Juneau, Alaska, has resigned to accept a position as government engineer stationed at Sitka, Alaska.

Carl A. Anderson, assistant to the chief of the construction division of the Seattle district office, U. S. Engineers, has been promoted from captain to major.

B. G. Felkner, engineer and superintendent of construction for the Altus-Lugert irrigation project near Altus, Okla., has been commissioned a captain in the Corps of Engineers at Camp Edwards, Mass.

Supervisory assignments among Army engineers of the Southwest division, as announced by **Col. Stanley L. Scott,** division engineer, include: **Col. W. W. Wanamaker,** Denison district, in charge of building at Amarillo, Tex.; **Col. Lyle Rosenberg,** district engineer, Alburquerque, N. M., buildings at Fort Huachuca, Ariz.

Maj. R. E. Niemz, of the Vicksburg, Miss., Army Engineer office, has been named to supervise projects of the War Relocation Authority at Hohwer and Jerome, Ark.

W. W. Towne, director of the division of sanitary engineering in the South Dakota State Board of Health, returned recently from a course of teaching at the University of Missouri, but has since been ordered to report for duty with the U. S. Public Health Service. He will be located at Cleveland, Ohio.

Emil G. Wood, chief project auditor with the U. S. Army Engineers at the Longhorn Ordnance Works, in Texas, has become chief auditor for the Austin Bridge Company.

J. L. Sorbel, of the sanitary engineering division of the South Dakota state board of health, has been stationed at Hot Springs, S. D., where increased population has created special sanitation problems.

Gerald W. Fling, Seneca county, Ohio, engineer, has been accepted for officers' training in the U. S. Army.

Arch Robison, of Celina, Ohio, has been granted a leave of absence as chief engineer for the Ohio Utilities Commission to become chief construction engineer at a

SMALL MOTORS ON PATROL —

Guarding America's Railways

Shipments of war material must have the "green light." Roadbeds need inspection and maintenance — bridges, railheads, and war shipments must be protected against saboteurs, wear and tear. So old-fashioned handcars and maintenance equipment give way to modern railroad machinery, much of which is powered by Briggs & Stratton 4-cycle, air-cooled gasoline motors. These sturdy, easy-starting motors can always be depended on to do their part in protecting and maintaining vital rail lines!

Users are urged to check their motors at regular intervals to insure top performance and longer life. If parts or service are needed, go to your dealer or an Authorized Briggs & Stratton Service Station.

Briggs & Stratton motors, from ⅔ to 6 h.p., are "drafted" for the duration — and are available only to those whose equipment is serving the war program — or for "essential" civilian uses. If your products fall in these classes we will try to serve you.

BRIGGS & STRATTON CORP., Milwaukee, Wis., U.S.A.

☆ Sanitary Protection Goes UNDERGROUND

Protection of health is a vital war necessity, and in exposed areas, sewage stations must be so built as to have least military vulnerability.

Fairbanks-Morse engineers are ready to aid city officials and engineers in solving this important problem. Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Illinois.

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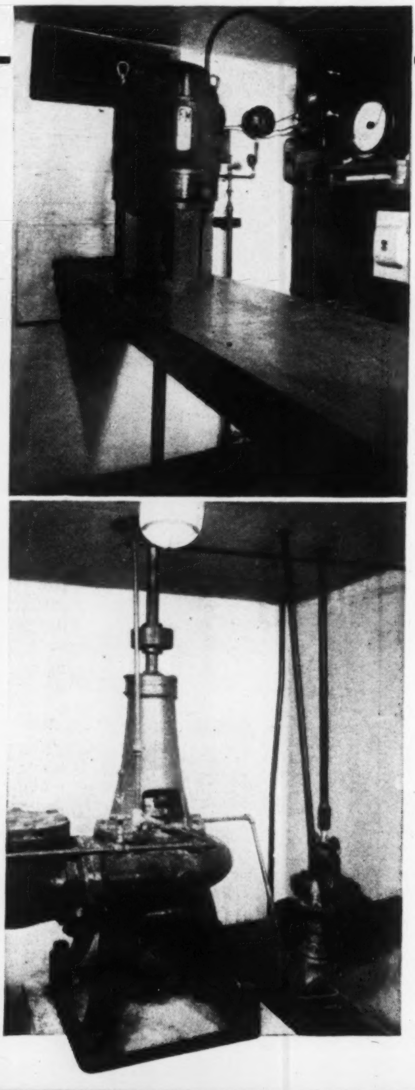


Upper and lower level views of an underground pumping station in Florida. F-M Motors are direct-connected to F-M Sewage and Trash Pumps

FAIRBANKS-MORSE F M PUMPS DIESELS MOTORS SCALES

new naval shell loading plant. **Paul Weiland,** of Lancaster, assistant chief engineer, will fill Robinson's place.

J. F. Bivins, senior resident engineer of Division 8, Lenoir, N. C., has been appointed city engineer of Mt. Airy, N. C.

Maj. Louis V. Bean, former city manager of Waycross, Ga., has been promoted to lieutenant colonel in the Corps of Engineers.

A. C. Verock, substation design engineer formerly with the Commonwealth & Southern Electric Co., has joined the Ohio Edison Co., at Akron, Ohio.

H. E. Boyd, manager of the Wilmington Port Traffic Association, of Wilmington, N. C., for the past 12 years, has been called to active service in the U. S. Army.

Joseph Emile St. Laurent, chief engineer of the St. Lawrence River Ship Channel for the Department of Transport, has been appointed a member and vice-chairman of the Canadian National Harbors Board.

W. L. Dickson, of Toronto, has been named county engineer and road superintendent of Lanark County, with headquarters at Perth, Ont.

Harold C. Lucht, formerly a civil engineer with the Harnischfeger Corp., of Milwaukee, has been commissioned a captain in the Corps of Engineers and assigned to the Buffalo, N. Y. district.

Thomas H. Milford, a graduate of Texas A. & M. and Harvard University, has been appointed chief engineer of the Alabama state health department's bureau of sanitation.

Harry Hendon, who resigned several weeks ago as Jefferson County, Ala., engineer, has become associated with Converse & Polk, consulting engineers. Hendon will be in charge of design of roads, water and sewerage.

Ernst C. Eggebrecht, who for 49 years has served the city of Milwaukee water department, will retire Sept. 16. He has been chief engineer of power plants. **Harrison B. Hoefer,** who has been assistant chief engineer of power plants, has been appointed chief engineer to succeed Mr. Eggebrecht.

Thomas Joseph Sabiston, of Jacksonville, Fla., has been commissioned a second lieutenant in the Corps of Engineers.

Earl Burton, of Birmingham, Ala., president of the Christie-Hutchinson-Burton Construction Co., left Birmingham recently to report for duty as a major in the Corps of Engineers.

All Kinds of Saboteurs Can't Be Stopped At the Gates

Fences and guards won't keep out accidents — as much to be guarded against as enemy agents

IN terms of crippling damage, on-the-job accidents are just as sinister as the human saboteur. Whenever precautions against them are relaxed, they are likely to strike suddenly and viciously, injuring and killing men, damaging equipment, wasting irreplaceable material, upsetting schedules.

To you, as a contractor faced with fast schedules and lack of trained manpower, the prevention of sabotage caused by accidents has become a "must". To help you achieve it most surely, American Mutual offers a safety engineering service perhaps unexcelled.

Always a leader in the safety movement, this Company aids its contractor-policyholders through safety consultants especially trained and experienced in construction work. These specialists set up and follow through proper controls. They give you every assistance in establishing safe operating conditions and practices and in forestalling accidents. With much war-time experience already behind them, they can undoubtedly save *you* worries, as well as serious losses.*

ACCIDENT PREVENTION — PLUS CASH SAVINGS

An opportunity to lower costs (and bids) is provided by cash dividends of 20% or more which American Mutual has always paid. Further savings result from reduced insurance rates — often as much as 30% below average — as reward for good safety records.

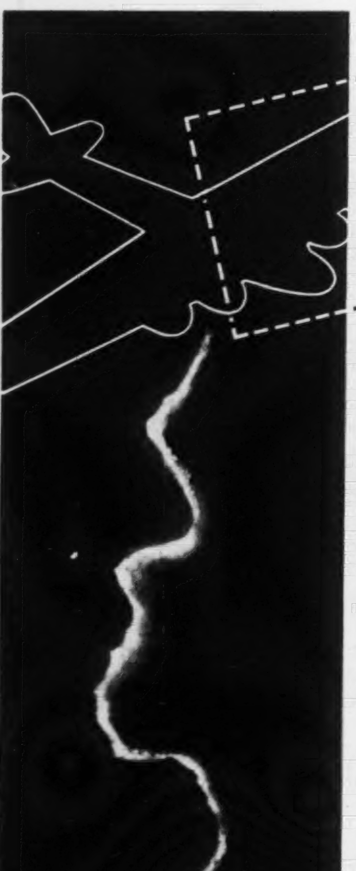
* Much accident prevention depends upon *foremen*, who may themselves be new to your particular set-up. Have us send you a free copy of "Foremanship", containing valuable information on hiring and training new foremen, and "refresher" material for experienced foremen. American Mutual Liability Insurance Company, Dept. O13, 142 Berkeley Street, Boston, Mass.

American Mutual Liability Insurance Company

AMERICAN MUTUAL
WORKS FOR YOUR SAFETY

Admitted Assets	$47,908,092.19
Liabilities	40,659,020.90
Surplus to Policyholders	7,249,071.29

As of December 31, 1941



NATURE MAKES BOMBING RAIDS WITH LIGHTNING—

BUT YOU CAN PROTECT VITAL WAR PRODUCTION

AGAINST THIS HAZARD

★ Protection of vital war production against accident and sabotage is an important consideration today.

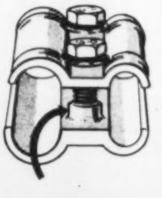
Lightning is Nature's bombing weapon. It can act either as a demolition or an incendiary bomb—can result in disastrous loss and delay.

That is why West Dodd Lightning Protection and static control equipment is being widely used on Army Ordnance Plants. Helping protect ammunition loading lines, standard magazines, underground magazines and bag loading buildings. That is also why many important industrial plants have West Dodd protection on power stacks.

TWO IMPORTANT FACTORS

The 12 old line companies, including the famous Dodd & Struthers Company, pioneer of modern approved lightning protection, are consolidated in West Dodd. This wealth of experience in building and installing lightning protection, and a long proved record of responsibility, are two important factors in your choice of such equipment.

The exclusive, West Dodd, easy-on, solderless bonding clamp. Eliminates hand-wrapping and soldering. Quicker to install. More permanent. Better electrical bond. Made of copper-bronze, tinned when necessary to prevent electrolitic corrosion. Note how boss provides greater number of threads to practically eliminate screw slippage. Sixteen different sizes carried in stock.



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WEST DODD

LIGHTNING CONDUCTOR CORP.
GOSHEN, INDIANA

MEETINGS

Roadmasters' and Maintenance of Way Association, Chicago, Ill., Sept. 15–17.

National Safety Council, 31st National Safety Congress, Chicago, Ill., Oct. 5–9.

American Welding Society, 23rd annual meeting, Hotel Cleveland, Cleveland, Ohio, Oct. 12–15.

American Society of Civil Engineers, Fall Meeting, jointly with the Engineering Institute of Canada, Hotel General Brock, Niagara Falls, Ontario, Oct. 14–15.

National Reclamation Association, Denver, Colo., Oct. 14–16.

American Public Works Association, Cleveland, Ohio, Oct. 18–21.

American Public Health Association, St. Louis, Mo., Oct. 27–30.

Federation of Sewage Works Associations, 3rd annual convention, Hotel Statler, Cleveland, Ohio, Oct. 22–24.

Institute of Traffic Engineering, Sherman Hotel, Chicago, Ill., Oct. 25–27.

Regional and Local Meetings

North Dakota Water and Sewage Works Conference, annual meeting, Great Northern Hotel, Williston, N. D., Sept. 21–23.

South Dakota Water and Sewage Works Conference, 8th annual meeting, Huron, S. D., Sept. 28–29.

American Waterworks Association, California Section, 23rd annual convention (War Conference), Oakland Hotel, Oakland, Calif.

Elections and Activities

Walter Melching, of Newport, Ky., vice-president of the Kentucky State Association of Master Plumbers, became president of the organization at a recent convention in Louisville. Other officers include: vice-president, John M. Wilbers of Louisville, acting secretary-treasurer, Albert Berger of Louisville.

Ministers of highways and public works from various provinces in Canada, with their deputies, will hold an interprovincial conference late this Autumn

OSGOOD
705
JAMES N. DRISCOLL CO.
GENERAL CONTRACTORS
PHILADELPHIA, PA.
INFORMATION

OSGOOD

is keeping pace with the needs of Contractors and Industry by developing excavating and materials handling machines to meet present day requirements.

OSGOOD AIR CONTROL

the smooth, velvety, effortless control force that brings the operating ease and efficiency of steam to this new OSGOOD Type 70 crane. OSGOOD Air Control is simple in operation, easy to maintain, and costs next to nothing. Even though our production schedule is full—now is a good time to check on OSGOOD Air Control.

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Sizes: 3/8 - 1/2 - 5/8 - 3/4
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6 to 12 Tons
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Sizes:
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DRAGLINES - CRANES
Crawler & Wheel Mounted

THE OSGOOD COMPANY, Marion, Ohio

POWERANDOS

...open second front

Creating a second front in Europe is a big job, a complex job . . . for the armed forces . . . over there . . .

But, there is a second front . . . *in industry* . . . over here!

It, too, demands unusual imagination, practical experience, long training, unified direction—by men of action!

WHO ARE THESE MEN? Waukesha calls them *the Powerandos!* The industrial counterparts of the famous Commandos, they are *picked men*—fearless and independent in their thinking . . . with regular service behind them . . . possessing the "know how" technique . . . alert and ready for any mission. They go into action according to precise plans. Their leader is Waukesha's "Chief of Combined Operations"—and his is a unified command . . .

They are Waukesha engineers and engine builders—all veterans of industry's first-front battle of production.

HERE'S HOW THE POWERANDOS MET THIS SITUATION

To widen a road in [redacted], 80-ft. poles, carrying power and telephone lines, had to be moved five feet. This earth-boring machine was designed and powered to do it *and did*—pulled out pole, bored new hole, re-set pole in new hole and moved to next location—*all in six minutes!* Thus transportation is speeded . . . communication kept free of interruption . . . victory hastened . . . by the co-operation of truck-builder, truck user and Waukesha engineers and engine builders.

ELECTRIFY
WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.
NEW YORK
TULSA
LOS ANGELES

MORE POWER FOR VICTORY

WAUKESHA ENGINES

instead of the usual convention of the Canadian Good Roads Association. This conference, which will probably be held in Ottawa, will discuss matters affecting highway maintenance and improvements, and also coordinate post-war plans for the employment of those to be rehabilitated in civilian life.

P. K. LEWIS, district engineer for the Portland Cement Association, has been elected president of the Fargo, N. D. engineers' club. C. B. Rathbun was elected vice-president; William H. Plath, secretary, and John B. Jardine, director.

ARTHUR DUPERRON, assistant general manager of the Montreal-Quebec Tramway Co., has been elected president of the Canadian Transit Association.

P. N. BROOKS is the new president of the Akron Chapter, National Association of Power Engineers. Other new officers include Richard S. Harrold, vice-president; C. C. Bunts, recording secretary; S. M. Davenport, corresponding secretary; K. M. Hayes, treasurer; Wallace Young, financial secretary; Vego Coombs, conductor and Louis Eckert, doorkeeper.

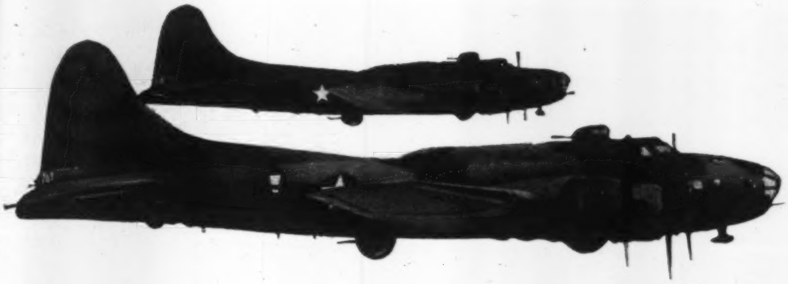
THE National Reclamation Association will hold its 1942 convention in Denver, Colo., instead of on the Pacific Coast as previously planned. Wartime activities on the West Coast, it was explained, prompted the decision of the Association's Directors. The convention is slated for October 14 to 16.

BECAUSE of circumstances beyond the control of the Executive Officers and Program Committee of the Pennsylvania Sewage Works Association, it has been necessary to cancel the Annual Conference originally scheduled to be held in Harrisburg, August 25th and 26th.

GUY BROWN, chief engineer of the St. Louis, Mo. Division of Sewers and Paving, was recently elected president of the Joint Council of the Associated Engineering Societies of St. Louis. R. C. Thumser was named vice-president and E. E. Carlson, secretary-treasurer.

VIGGO JEPSEN has been elected chairman of the St. Maurice Valley Branch of the Engineering Institute of Canada.

AT the annual meeting of the Northwestern section of the Illinois Waterplant Operators' Association, held at Peoria, Ill., late in July, R. E. Graham, superintendent of waterworks at Galesburg, was elected as chairman, and L. T. Sampson, engineer of waterworks at Dixon, Ill., was elected as secretary.



BOEING *BOOSTS* PRODUCTION WITH KARDEX RECORD CONTROL

"The guts and back-bone of our world-wide air offensive" ... *that's the Boeing B-17. But the Commanding General of the U. S. Army Air Forces had something more than* design *in mind when he cited the fabulous Flying Fortress.*

For today it is Boeing's productive skill ... it's ability to set to mass production this bomber with thousands of intricate details ... that makes our offensive more than a promise.

Today, Boeing has the needed administrative Know-How to produce in quantity—and Kardex has helped it to focus on speed.

★How does Boeing's Production Record boost their speed of production in their Kansas plants? Like this .....

1. It provides an absolute check on whether necessary production orders have been released to produce the parts needed for assemblies.
2. It signals *when* to release additional production orders.
3. It indicates, instantly, what parts must be rushed to prevent a shortage.
4. It reveals, immediately, the slightest slow-down in deliveries of parts, indicating where follow-up pressure is needed.
5. It tells at a glance the quantity on hand of *every* part for *every* assembly.

In other words, this highly efficient Kardex Production Control System is nothing more than a swift, sure system for *preventing* the shortages that hold up production. It's not a procurement record—but it directs the procurement system. It's not a stock record—although it summarizes and controls material inventory. It's a fool-proof aid for sustained output ... a positive method for reducing material shortage.

What's more, Kardex is simple. It can be understood by the newest office boy, can be securely maintained by the average clerk. And it's *visible.* Important administrative data is graphically signalled on the exposed margin. Analysis and recap take but a matter of moments.

Boeing is but one of the great aircraft producers depending on Kardex for close production control. Examine the list at the right. Almost every great aircraft manufacturer is a user of Kardex control.

Yes ... and 80% of the Navy's "E" winners use Kardex-ed records for their critical production jobs!

AMONG THE AIRCRAFT USERS OF KARDEX PRODUCTION CONTROL

ALLISON
BEECH AIRCRAFT
BELL AIRCRAFT
BELLANCA
BENDIX AVIATION
BREWSTER AIRCRAFT
CESSNA AIRCRAFT
CONSOLIDATED
CONTINENTAL MOTOR
CURTISS-WRIGHT
DOUGLAS
FAIRCHILD
FLEETWINGS INC.
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HAMILTON
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GLENN L. MARTIN
NORTH AMERICAN
PRATT & WHITNEY
RYAN AERONAUTICAL
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VULTEE AIRCRAFT
WACO AIRCRAFT
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KARDEX
visible systems of
PRODUCTION CONTROL

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MANAGEMENT CONTROLLER #686

We have prepared a thorough analysis and description of the records, routines and equipment employed by several famous aircraft producers for the use of qualified manufacturing executives. This is a free service and entails absolutely no obligation.

Because of the confidential nature of much of the material, however, this book is offered on a loan basis only. It describes systems that are applicable to *any* manufacturing enterprise with slight alterations. It covers personnel, procurement and material control—as well as production methods.

A request on your letterhead—or by telephone to your nearest Remington Rand branch—will bring this study promptly to your desk. Ask for it today. Remington Rand Inc., Buffalo, New York. *Offices Everywhere.*

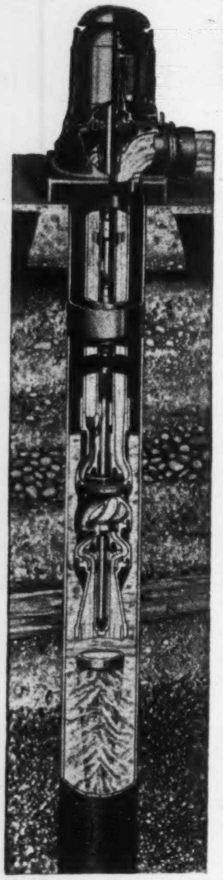
A tap-full or a torrent

PEERLESS PUMPS Provide Water for Most Every Industrial, Commercial and Domestic Use

In size, type of drive, choice of lubrication, for any depth or any practicable head, with lasting quality and sustained performance, your safest and most economical investment for lifting water is a Peerless Pump. Peerless Pumps' wide range of capacities can provide from 10 to 100,000 gallons of water per minute—a tap-full or a torrent.

CUSTOMER PREFERENCE . . . Evidence of Peerless leadership is the roster of Peerless owners which contains thousands of industrial and commercial concerns whose names and products are household words, the world over. The benefits of the judgment and experience of their engineers are yours when you buy a Peerless Pump.

Consult your nearest Peerless Distributor for pre-sale information, post-sale service.



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ALL FORMS OF DRIVE

NATIONWIDE SUPER SERVICE

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New Aids to the Constructor

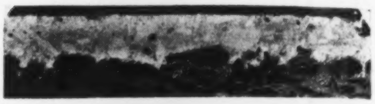
Equipment and material announcements and manufacturers' news

Powerful Tractor

Powered by two heavy duty tractor drive units, including two motors, this Crescent tractor provides a maximum of traction, safety, and flexible operation. Its makers claim it to be the most powerful of all electric tractors. Features include four wheel, extra large external contracting brakes, mounted on worm shaft, providing equal braking on all wheels. Frame is of extra heavy construction from standard plates and shapes, hot riveted and welded into rigid and mono-unit construction. This model, "NTTD," offers a drawbar pull of 800 lb. normal, 3,600 lb. ultimate. Overall length is 84 in., wheelbase 48 in., overall height 59 in.—*The Crescent Truck Co., Lebanon, Pa.*

Victory Packing

The Hydraulic Development Corporation has announced a new Victory packing called "Fibrex." Dry braided Fibrex takes the place of braided jute used with Hydro-Tite or similar self-caulking compounds employed to joint cast iron ball and spigot water mains. Fibrex has a water repellent core and strong woven paper covering which packs into a joint in exactly the same manner as braided jute.—*Hydraulic Development Corporation, 50 Church St., New York, N. Y.*



Non-slippery flooring

Designed to produce non-skid floors, either wet or dry, the Walter Maguire Co., Inc., are offering Cortland Emery Aggregate, a mixture of scientifically graded large and small particles of mineral emery. For application, the Cortland emery aggregate and nothing else is mixed with portland cement and water for the floor topping. Even when an emery aggregate floor is wet, it provides a firm,

Lightweight concrete blocks for sabotage protection

To take the place of costly, short-lived sandbag barricades for sabotage protection around power transformers, sub-stations and other vulnerable public utility and industrial equipment, the Celotex Corporation has devised an economical wall of lightweight concrete blocks filled with sand. Blocks for the walls are made with Celocrete lightweight aggregate, an expanded blast furnace slag. Tests have demonstrated that a wall of 12-in. hollow blocks filled with sand will stop high-powered 30-calibre military rifle and machine gun fire at distance as short as 10 ft. The wall is said to have several advantages over traditional sandbag barricade, in that it costs from one-half to two-thirds less, and its life is many times longer. Concrete masonry protective walls of this type in various parts of the country average between 45 cents and 50 cents per square foot, including sand filling, compared to 85 cents to $1.50 per square foot for sandbag walls, according to the block manufacturers.—*The Celotex Corporation, 919 N. Michigan Ave., Chicago, Illinois.*

EVERY MAN COUNTS FOR MORE WHEN SKILSAW TOOLS *SPEED* WAR CONSTRUCTION!

Here SKILSAW DISC SANDERS are cleaning concrete forms . . . used with sanding disc or wire wheel brushes. Also grind columns. Remove ribs and fins left from concrete forms.

SKILSAW cuts all lumber. One man can saw 8x16 timbers (2 cuts) far faster than can be done with a 2-man saw. 9 POWERFUL MODELS and big, fast-cutting Pneumatic SKILSAW.

SKILSAW DRILL speeding up deep wood boring in super-structure timbers. Also used for drilling Masonite and other composition boards.

SKILSAW SPEED BITS will solve your wood-boring problems. Especially designed to eliminate binding by faster chip clearance. Out-perform and out-last all others. Sizes available from 1 in. to 3 in. diam.

KNOW why 9 out of every 10 War Contractors use SKILSAW TOOLS? The answer's simple—these husky, easy-handling tools rush arsenals, cantonments and War Plants to completion *faster!* They do more jobs . . . and save more time on every separate operation.

SKILSAW TOOLS are lighter, more compact, yet far more powerful. Ask your distributor for a demonstration on your own jobs and you'll understand why contractors everywhere say that SKILSAW TOOLS make every man and every minute count *for more!*

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SKILSAW PORTABLE ELECTRIC TOOLS

★ ***MAKE AMERICA'S HANDS MORE PRODUCTIVE*** ★

BROTHER, THIS IS WAR!

War jobs demand speed with accuracy

. . . Arkwright gives you both!

Those blueprints whirling through the machine must be sharp and clear – or else! Mistakes on war jobs can be as bad as sabotage – why risk them by using inferior tracing cloths? Arkwright's superb, uniform, closely-woven finish is your best protection. It assures perfect jobs – now and for years to come. Give your men this inexpensive aid to better work. Arkwright Finishing Company, Providence, R. I.

Arkwright TRACING CLOTHS

AMERICA'S STANDARD FOR OVER 20 YEARS

100 LBS.
HYDRO-TITE
WATER TIGHT
WATER PIPE JOINTS
HYDRAULIC DEVELOPMENT CORPORATION
BOSTON-NEW YORK

TIME-TESTING JOINTING COMPOUNDS

for Bell and Spigot Water Mains

10 REASONS FOR USING

1. One lb. **HYDRO-TITE** equals 4 lbs. lead.
2. Stands any pressure the pipe can.
3. Joints showing seepage will take up.
4. Requires no calking so speeds job
5. Anyone can make tight joints.
6. Permanent as the pipe itself.
7. Stands deflection and vibration.
8. 30 years without a failure.
9. Shipped promptly.
10. Demonstration without charge.

Write for JOINTING BOOK

HYDRAULIC DEVELOPMENT CORP.

50 CHURCH STREET — NEW YORK, N. Y.

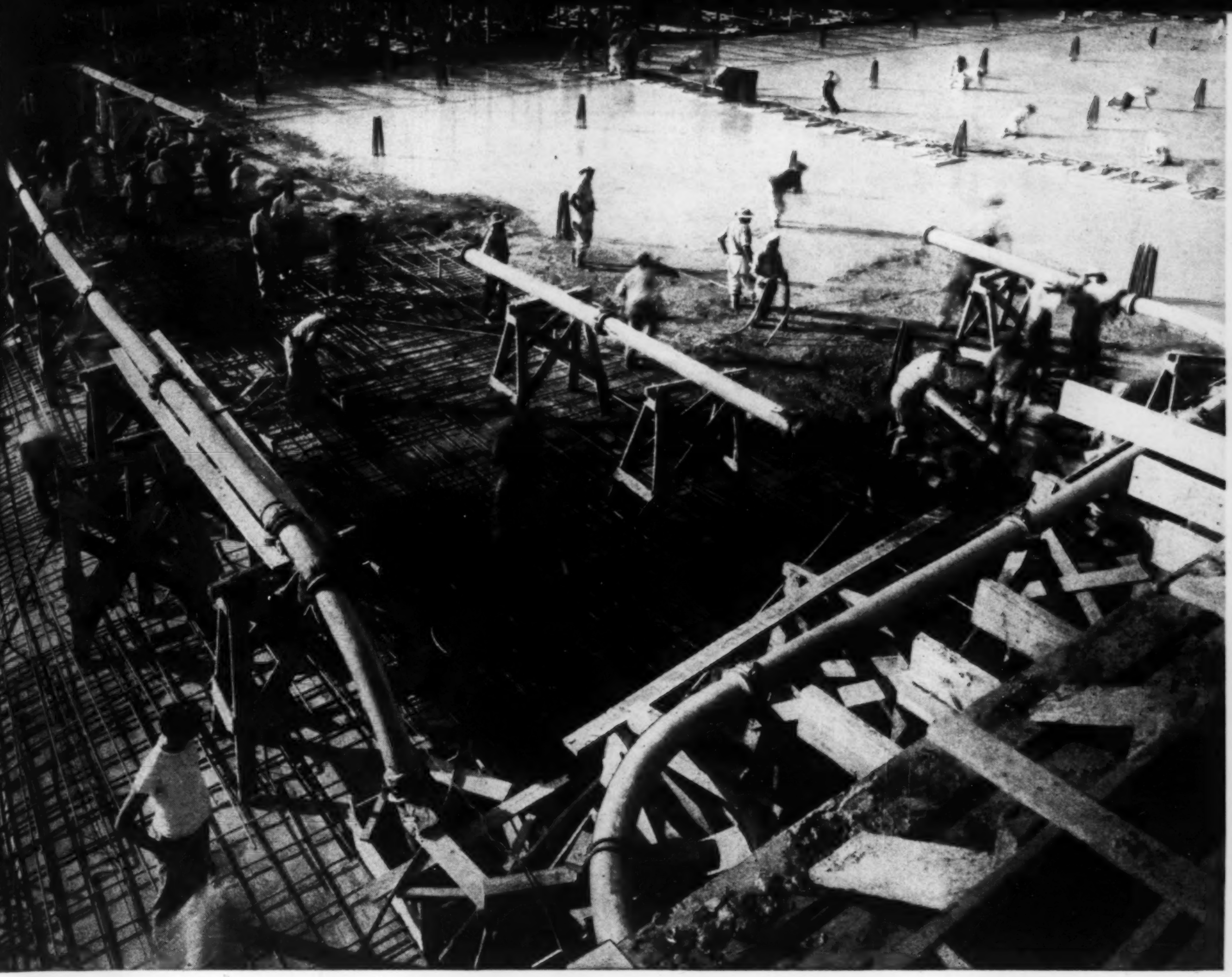
non-slip gripping surface. This quality is said to improve with wear, the floors actually becoming safer with use. In addition, the flooring is said to greatly increase load-bearing qualities. The aggregate floor mixture specimen will support a load of more than 14,000 lb., while tests indicate that a standard test specimen of ordinary concrete floor mixture will break under a load of 6,200 lb.—*Walter Maguire Co., Inc., New York, N. Y.*

Speeding Print Drying

Production of Van Dykes prints has been speeded up by 350 percent, and the number of rejected prints reduced from 25 percent to zero by the use of an infra-red drying lamp, according to the Westinghouse Co. In processing, the Van Dykes are kneaded in water and fixing baths, then hand-squeeged on a steel roller, and finally put through an electrically heated dryer. Under the old method, drying time was ten minutes, and the squeegeeing often distorted the drawings to such an extent that they had to be scrapped. But fidelity reproduction and reduced drying time were attained by using a bank of twelve 250-watt infra-red lamps, to replace the steel roller and drying unit. Van Dykes up to 102 by 36 in. are hung beneath lamps strung in three rows 9 in. apart. The four lamps in each row are spaced every 2 ft. Drying time for the average size print is only three minutes instead of ten, and there is no distortion, the manufacturers say.—*Westinghouse Electric Co., East Pittsburgh, Pa.*

Speedy Welder

To meet the war need for continuous high-duty mass production welding, the Ergolyte Manufacturing Co. has announced the development of a new heavy-duty air-cooled arc welder, known as the 250 F. The new machine contains a built-in cooling system, and is



Now, more than Ever
WAREHOUSES BY PIPELINE!

Concrete is pumped in place by two Rex Pumpcretes on the floors for a new United States Quartermaster's depot—a job entailing 52,000 cu. yds. of Pumpcrete-pumped concrete!

WE have always said that the Rex Pumpcrete was a "natural" for most concrete jobs—because it simplifies the job of placing concrete in difficult form work—because Pumpcrete permits a snappier, more orderly job progress—because Pumpcrete saves the money and time formerly spent in erecting and operating buggy runs, chutes, hoists, towers and other old-fashioned equipment.

Today, speed is important—and speedy placement of concrete is one of Pumpcrete's biggest advantages—placing on many jobs up to 65 cu. yds. per hour with one machine.

Before you bid on any defense contract, take a look at Pumpcrete. See it first in the book, "Why and Where to Pump Your Concrete." To get your copy, simply write 1633 W. Bruce Street, Milwaukee, Wisconsin.

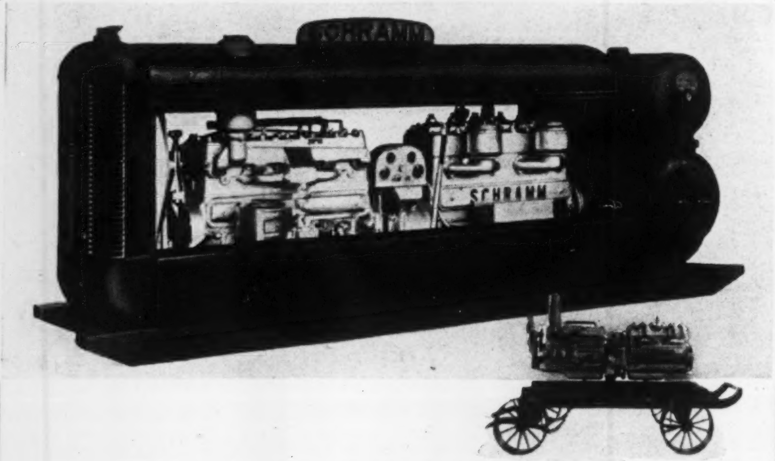
REX **PUMPCRETE**

THE PUMP THAT PUMPS CONCRETE

Sizes for Pumping from 15 to 65 cu. yds. per hour

CHAIN BELT COMPANY OF MILWAUKEE

Easy to Start–
Hard to "Stop"



The rigid, permanently aligned Schramm compressor and engine are mounted into the frame as one complete unit.

From the big 420 cu. ft. actual air compressor to the versatile little 20 cu. ft. every SCHRAMM compressor is a compact package of power—always ready to start at the touch of a button; yet never ready to quit on the toughest jobs. From the Arctic Circle to the Tropics users have found that SCHRAMM all-weather compressors incorporate advantages that assure them of a dependable source of air power with a minimum of attention or servicing.

GASOLINE–DIESEL–ELECTRIC

You know which size, type and drive is best suited for your requirements. SCHRAMM knows best how to build it. For back of every compressor bearing our name are 42 years of engineering and research devoted exclusively to this equipment.

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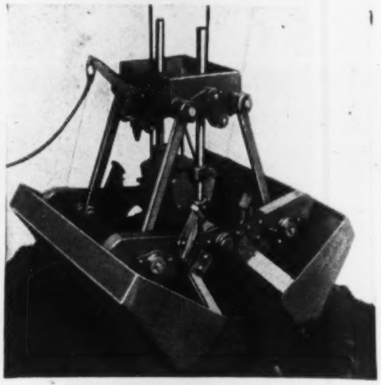
PORTABLE AIR COMPRESSORS

SEND TODAY FOR CATALOG 42-P ⟶

SCHRAMM The Compressor People

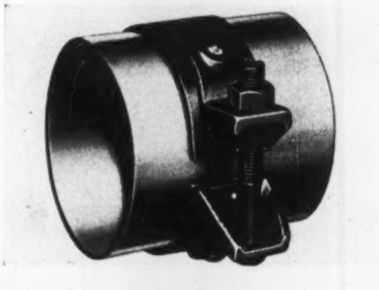
SCHRAMM, INC.
WEST CHESTER, PA.
DEALERS IN PRINCIPAL CITIES

heavier all around than its sister model, the non air-cooled Ergolyte 250. The makers point out that under normal conditions naturally cooled welders would get a chance to cool down, while their operators changed rods, removed slag and position work. Today, however, the active duty cycle is at a peak. Consequently, the welding machine is in almost constant use.—*The Ergolyte Manufacturing Co., Lawrence St. at Erie Ave., Philadelphia, Pa.*



Single Line Grab Bucket

While originally designed for handling sand and refuse in foundries, the single line grab bucket was quickly found to be equally efficient in handling gravel, crushed coal, mill scale, and various other bulk material. As a labor-saver, it is said to be unsurpassed. One of its principal features is the ease with which it is attached to any crane, hoist, or derrick hook, and its quick detachment when no longer needed. No change in reeving is necessary. The bucket is made in five sizes from ½ to 2½ yd. capacity. —*Harnischfeger Corporation, Milwaukee, Wis.*



Band Clamp

The Dresser Mfg. Co. announces a newcomer to its regular line of repair devices—Style 77A band clamp—for the quick repair of small pin holes, leaks and splits in straight runs of pipe. This new clamp is claimed to be one of the most useful and handy items now available for repair work. Simple in construction, easy and fast to apply, it prevents further damage and loss of line contents

GULF LUBRICANTS *and* FUELS

help speed up

huge housing project

CORBETTA CONSTRUCTION CO.
NEW YORK CITY
4
4

Three large New York contractors — Corbetta Construction Company, Willcox Construction Company, and Knickerbocker Concrete Arch Construction Company —are working together as The Three Companies on the Fort Greene Housing Project, Brooklyn, New York. This huge project comprises 35 buildings with reinforced concrete superstructure. The concrete is being poured entirely by crane, the largest job of its kind in the country to be handled in this way. The pouring crane has a 140-foot boom. Gulf lubricants and fuels are helping this contractor stay well ahead of schedule.

"Gulf products are largely responsible for the fine performance of all our equipment on this job . . . one of the reasons we are well ahead of schedule"

says Contractor

"OUR equipment has performed without a hitch on this job with Gulf lubricants and fuels in service — no breakdowns, and no delays caused by mechanical troubles," says contractor on huge housing project. "That's one big reason why we're well ahead of schedule — and why we expect to maintain our fast pace until the job is finished."

You, too, will find it pays to call in the Gulf engineer to prescribe the right Gulf lubricants and motor fuels for your equipment. If the most suitable type of lubricants are selected for every lubricating requirement of your various units you can get maximum trouble-free job performance at minimum expense for maintenance and repairs.

No matter where your job is located, you are sure of quick delivery of Gulf quality lubricants and fuels through more than 1200 warehouses located in 30 states from Maine to New Mexico. Write or 'phone your nearest Gulf office today.

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24 hrs. with

Especially constructed laminated fibre wax treated

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CONCRETE PIER FORMS

9	10	11¼	12	13½	Inside Diam.
64	78.54	100	113.1	144	Square Inches

Lengths up to 24 feet. Saw to size on job.

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JACKSON Hydraulic Concrete Vibrator

DESIGNED TO "TAKE IT" 3 SHIFTS A DAY—EVERY DAY

- Automatic pressure lubrication—requires no attention.
- 34-ft. hose—2¾" vibrator head.
- Adjustable frequency to 6800 R.P.M.—submerged in concrete.
- Powerful gas engine—4.7 H.P.
- Long-lived, ball-bearing, rotary, hydraulic pump.

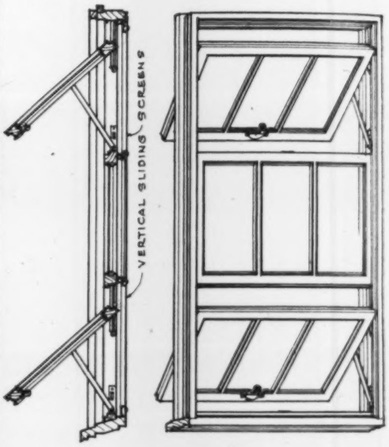
USED EXCLUSIVELY BY MANY LARGE DEFENSE CONTRACTORS

ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON, MICHIGAN

where small defects in the line occur. An unusual, range of sizes is offered.—*Dresser Mfg. Co., Bradford, Pa.*

Paint Products

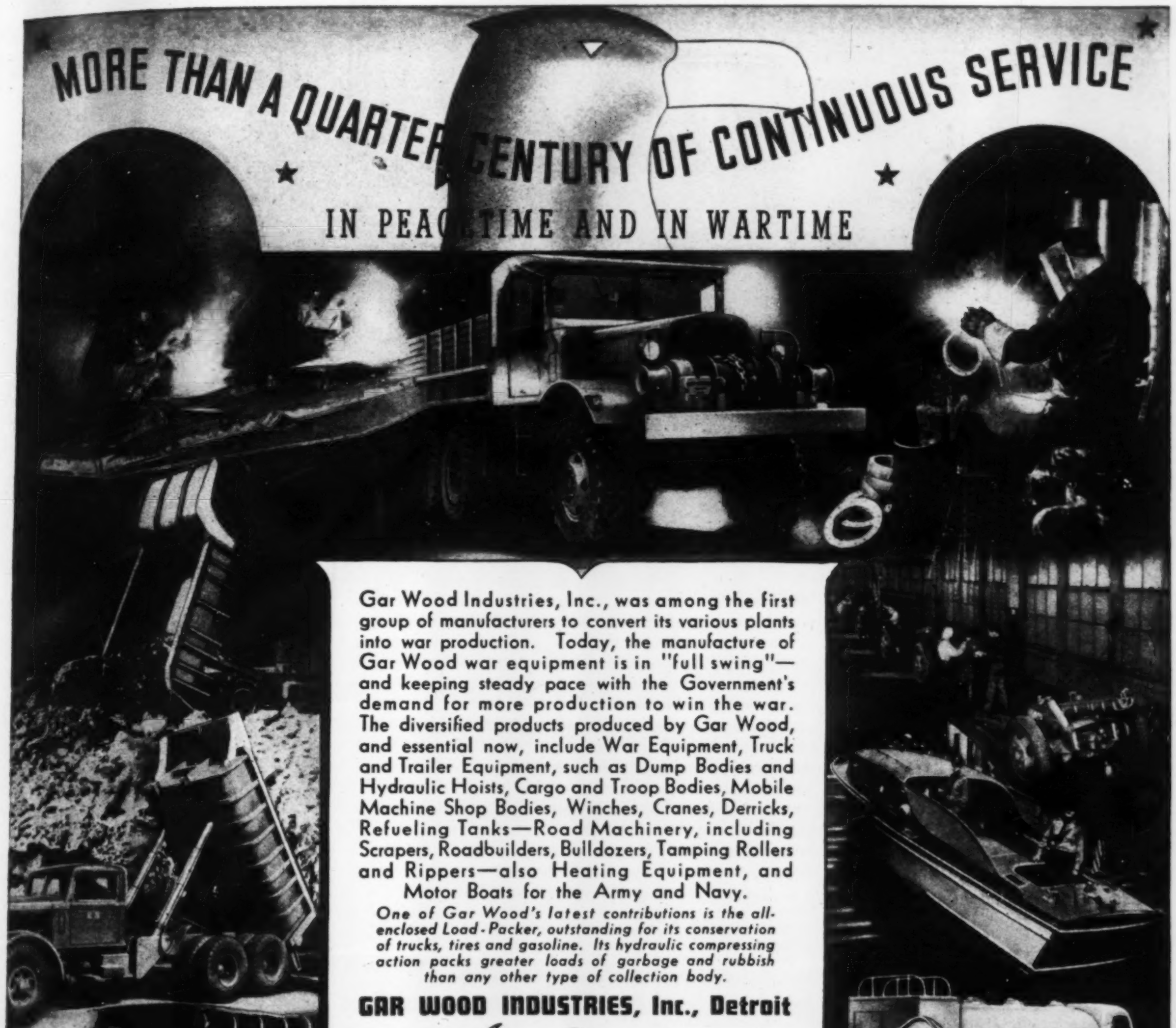
A new paint product that primes, seals and finishes on any exterior surface in one coat, has been announced by American-Marietta Co. The product has been formulated for maintenance painting of industrial, institutional and commercial properties, with qualities that permit either application with minimum labor. Designated Valdura Singlekote, it combines the hiding power and economy of water-type paints with washability, durability and performance of oil-type coatings, according to the manufacturer. It may be applied to surfaces previously coated with calcimine or casein paints, providing the old covering is bonded, or tight to the wall.—*American-Marietta Co., 43 E. Ohio St., Chicago, Ill.*



Standardized Wood Sash Units

Eighteen standard basic units of projected wood sash have been developed by the National Door Manufacturers Association, in an effort to effect a degree of window standardization, particularly in the field of industrial and commercial buildings, schools, hospitals, etc. Designs for the sash were prepared by the Chicago architectural firm of Graham, Anderson, Probst & White, and the sash will be manufactured both by members of the association and other mills. Known as National Projected Wood Sash, the units may be installed individually, or may be combined in height and width to meet almost any requirements.

The standardized frame is designed to accommodate either bottom pivoted in-projecting vents or top pivoted out-projecting vents without modification or change in the hardware requirements. The operating hardware is friction con-


MORE THAN A QUARTER CENTURY OF CONTINUOUS SERVICE
IN PEACETIME AND IN WARTIME
GAR WOOD
GAR WOOD
WORLD'S LARGEST MANUFACTURER of TRUCK and TRAILER EQUIPMENT

Gar Wood Industries, Inc., was among the first group of manufacturers to convert its various plants into war production. Today, the manufacture of Gar Wood war equipment is in "full swing"—and keeping steady pace with the Government's demand for more production to win the war. The diversified products produced by Gar Wood, and essential now, include War Equipment, Truck and Trailer Equipment, such as Dump Bodies and Hydraulic Hoists, Cargo and Troop Bodies, Mobile Machine Shop Bodies, Winches, Cranes, Derricks, Refueling Tanks—Road Machinery, including Scrapers, Roadbuilders, Bulldozers, Tamping Rollers and Rippers—also Heating Equipment, and Motor Boats for the Army and Navy.

One of Gar Wood's latest contributions is the all-enclosed Load-Packer, outstanding for its conservation of trucks, tires and gasoline. Its hydraulic compressing action packs greater loads of garbage and rubbish than any other type of collection body.

GAR WOOD INDUSTRIES, Inc., Detroit

G A Baratt
President

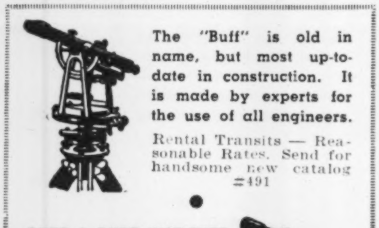
Design Does It
and Gives You These Outstanding Advantages
CLOSED
ROTATING
OPEN

THE ROTOVALVE design provides these unique advantages because the plug:

lifts, rotates and seats . . . assures through, unobstructed flow . . . provides minimum loss, as the loss through a Rotovalve, when open, is no greater than it is through a pipe of equal diameter and length . . . is obtainable in sizes from 6 to 60 inches, with controls that meet a wide-range of services . . . may be operated manually, hydraulically, or by motor.

Enjoy these advantages, just as modern waterworks and new war-material plants are benefitting by them! Specify ROTOVALVES for your next job—*and be doubly sure!*

S. MORGAN SMITH COMPANY
YORK, PENN.



The "Buff" is old in name, but most up-to-date in construction. It is made by experts for the use of all engineers.

Rental Transits — Reasonable Rates. Send for handsome new catalog #491

BUFF & BUFF INSTITUTE
J. P., Boston, Mass.

The BUFF "X" TELESCOPE has the finest and highest definition and simplest lens system. It is useful when the light is dim.

WILLIAMS *Buckets*

Welded Rolled Steel Construction

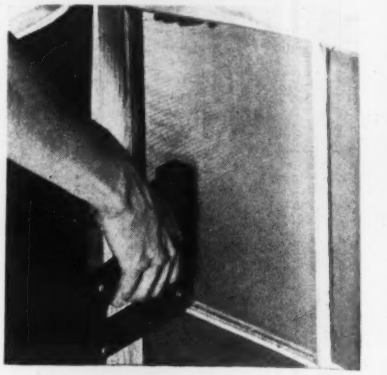
All types and capacities for all conditions. Send for Catalog.

The Wellman Engineering Company
7000 Central Ave., Cleveland, O.

1

built by WELLMAN

trolled and holds the ventilator in any desired open position without danger of banging or slamming with resultant glass breakage. The sash are made particularly for manual operation, but various types of mechanical operating devices are available for long line sections of horizontally projected ventilators.—*National Door Manufacturers Association, Inc., 322 South Michigan Ave., Chicago, Ill.*



New type window pane

A new type window pane of transparent plastic, laminated with wire mesh, that will withstand the explosion of a 150-lb. bomb 8 ft. away, has been developed for use in military construction and industrial plants in potential air raid zones. Developed by the Plastics Division of the Monsanto Chemical Co. in cooperation with the U. S. Navy, the new material has stood up without appreciable damage under a 28-in. vacuum, while clear glass shattered at 15 in. and heavy wire-reinforced glass at 26. A quarter pound ball dropped from a height of 20 in. smashed ordinary glass, while it required dropping a 2 lb. ball from a height of 42 in. to penetrate a pane of the plastic. The material consists of standard 16-mesh wire screening sandwiched between two sheets of Vuelite—a transparent cellulose acetate sheeting originally developed for fluorescent lighting fixtures. Sheets can be drawn or formed to almost any desired shape.—*Monsanto Chemical Co., Springfield, Mass.*

Fluorescent Fixture Circuit

Development of a new circuit for fluorescent lighting fixtures and a specially designed ballast control unit, a system which makes possible a saving of millions of pounds of critical metals, has been announced by General Electric Lamp Department at Nela Park. The new circuit permits the use of only one ballast—or control unit—with four 100-watt Mazda fluorescent lamps in place of the present 100-watt fluorescent fixtures which require two ballasts for four lamps. The two lamps on each phase of

Bursting Bombs and
Bursting Mains Can
Conquer Great Cities

INTERNATIONAL NEWS PHOTO

MAKE AMERICA STRONG...IN THE AIR...AND IN THE GROUND!

Build the sturdiest pressure lines possible with Lock Joint Reinforced Concrete Pipe. Walled by dense concrete, reinforced with tough steel, Lock Joint pipes are a bulwark of defense against the forces of concussion. The unusual elasticity and flexibility of the expansion joints safeguard each length of pipe under the stress of sudden and unequal earth movement. Nor can those enemy agents of time, corrosion and tuberculation, successfully attack or sabotage the steady-smooth flow of these pipes. They will maintain their original high-carrying capacity for generations... In keeping with these strenuous times Lock Joint pipes lines are "tailor-made" to your particular requirements, thereby using less of those essential materials so necessary to our war effort. Whether your project is large or small, your 'phone call, telegram, cable or letter to any of our offices will bring a prompt reply.

LOCK JOINT
Reinforced Concrete
PRESSURE PIPE

LOCK JOINT PIPE COMPANY
Established 1905
AMPERE, NEW JERSEY
Denver, Colo. • Chicago, Ill. • Kenilworth, N. J. • Kansas City, Mo. • Rock Island, Ill.
White Plains, N.Y. • Valley Park, Mo. • Cleveland, Ohio • Hartford, Conn. • Navarre, Ohio

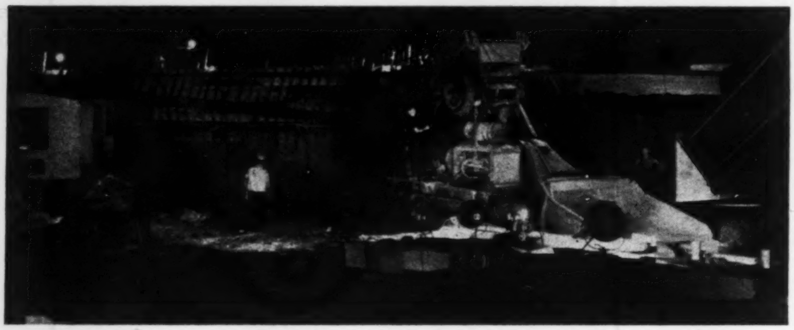
SCOPE OF SERVICES *Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply Mains as well as Concrete Pipe of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous lines.*

You Can Use Your Homelite Generators

Right Around the Clock

Keep your Homelite Portable Generators busy. They'll work for you 24 hours a day. They'll help you build faster even if you're short of man-power. They'll cut down on delays, waste, and accidents.

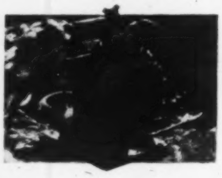
On the Day Shift—Use your Homelite Generators to operate electric hand tools. With a Homelite, you get electricity where you need it and when you need it. No delays. Set the unit up anywhere—start the built-in gasoline engine—and instantly, you have 1800 watts, enough to operate saws, drills, and many other time-saving electric tools.



On the Night Shift—Use your Homelite Generators for operating brilliant floodlighting as well as electric tools. Portable Homelite-operated floodlights help you keep operations going through the night. They give your men the illumination they need to work quickly, efficiently, and *safely.*

THE PUMPS WILL SAVE TIME, TOO

Keep your Homelite Pumps on the job also. They will handle seepage just as well as 15,000 gallons per hour. They will keep excavations drier. Your men will work faster Delays will be eliminated.



HOMELITE
HOMELITE

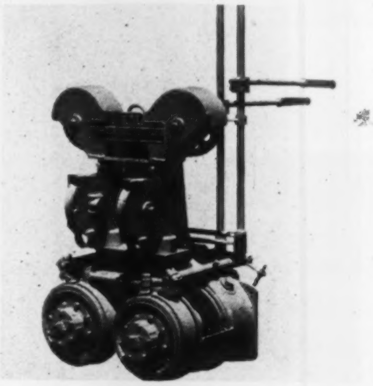
SEND FOR THESE BOOKS

Our service manuals show how to keep Homelite Pumps and Generators in good condition. Send for copies. Specify model and serial numbers of your units.

HOMELITE CORPORATION

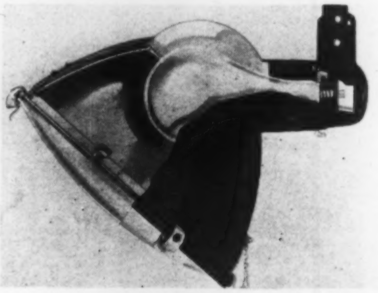
2908 RIVERDALE AVENUE, PORT CHESTER, N. Y.

the new circuit start in sequence and operate in series. Thus, one ballast does the work of two, effecting important economies in any fluorescent installation where the new circuit can be used. Although it is designed for use only with 100-watt fluorescent lamps and on 254, 265 and 277 volt circuits, many of the new war industry plants have this voltage available and other plants now being converted can be changed over to take advantage of the circuit.—*General Electric Co., Nela Park, Cleveland, Ohio.*



Power Control

The Model S-2 (double drum) Heil power control unit shown, is designed and built for use with all makes of tractors from 50 to 150 hp. This double drum model is an all-purpose unit providing two-line cable control for operation of twin cable scoops, or for operating two single cable units such as a bulldozer-ripper combination. Every feature has been provided to insure increased output and reduce operating expense. Gears, bearings, shafts, housing and superstructure are all designed and tested to withstand a line pull of 8,000 lb. on the bare drum with ample safety factor. Finger-tip control gives lightning-fast response with a minimum application of energy.—*The Heil Co., Milwaukee, Wis.*



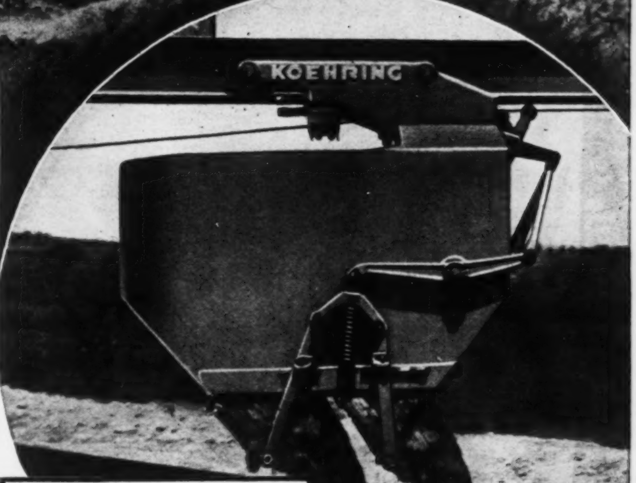
Floodlights

Designed especially for lighting shipyards, construction projects, industrial yards and sports areas, the new wide and narrow beam floodlights are announced

DOUBLE-ACTION SPREADING--

FAST DUMPING CUTS BATCH CYCLE TIME

One second-saving advantage of Koehring Twinbatch and Unibatch Pavers is the Twin-Door Boom Bucket. Twin-doors give instantaneous double-action by both opening, dumping and spreading in the same direction at the same time, without any choking by dry or harsh concrete. This saves valuable time. Here is just one of the features of Koehring Pavers which cut batch cycle time.



Twin-doors give approximately 13 square feet door opening, dumping in the same direction. Bucket has capacity to carry maximum batch in one trip.

KOEHRING HEAVY DUTY

KOEHRING CO., ***Milwaukee, Wis.***

HEAVY-DUTY CONSTRUCTION EQUIPMENT

Scrapers and Cableways

...for All Kinds of Long Haul Work

Sauerman Drag Scraper handles huge stockpile of crushed stone on concrete dam project.

Slackline Cableway cleans out a tailrace, moving tons of rock from stream to spoil pile.

SAUERMAN Slackline Cableways and Drag Scrapers offer the most satisfactory solutions for material-handling problems requiring machinery that will dig, convey and automatically dump.

These machines will dig any material that a plough can penetrate. One man controls the entire operation. Power cost and maintenance are exceedingly low per cubic yard of material handled.

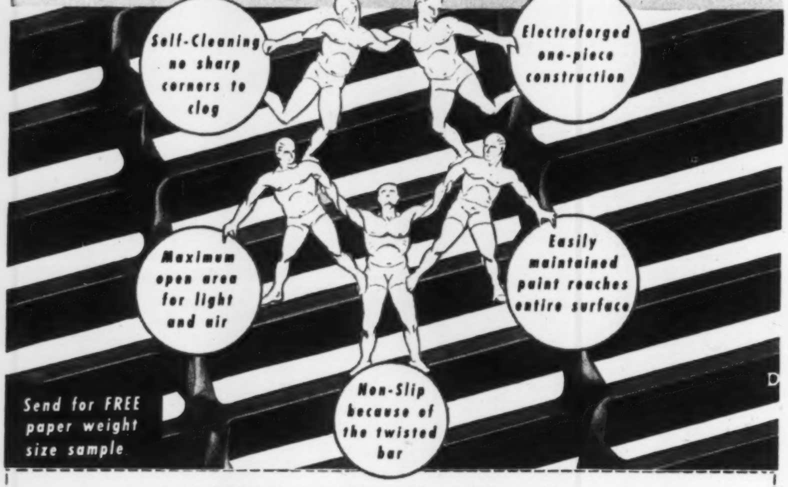
A Sauerman machine digs with equal facility under water, on mushy ground, on a hillside or in a rough pit. Operation is continuous—digging, hauling and dumping. Capacities run from 10 to 600 cu. yd. per hour, varying in accordance with size of bucket and length of haul.

Thirty years of successful service have established the superiority of Sauerman machines for a great variety of long range material-handling jobs.

WRITE FOR CATALOG.

SAUERMAN BROS., INC.
532 S. Clinton St., Chicago

BLAW-KNOX GRATING
PRESENTS 5 OUTSTANDING FEATURES



Self-Cleaning no sharp corners to clog
Electroforged one-piece construction
Maximum open area for light and air
Easily maintained paint reaches entire surface
Non-Slip because of the twisted bar
Send for FREE paper weight size sample

BLAW-KNOX DIVISION of Blaw-Knox Co.
2001 FARMERS BANK BUILDING · PITTSBURGH, PA.

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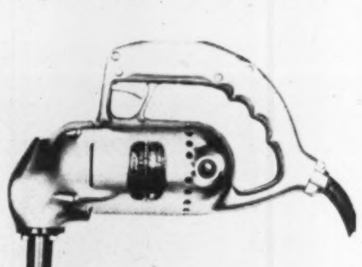
CITY ____________ STATE ____________

by Westinghouse Electric & Mfg. Co. Both the VE-18, wide beam, and VEG-18 narrow beam units are equipped with a snap cover having a heat resisting glass lens, making them dust-tight and moisture-proof to prevent accumulation of dust and dirt on the reflecting surface.—*Westinghouse Lighting Division, Edgewater Park, Cleveland, Ohio.*

Disc Meter

The "Ironside" disc water meter was shown for the first time at the exhibit held in connection with the American Water Works Association Conference at Chicago recently. Immediate production of this meter is said to have been made possible by months of preparation by the manufacturer preceding the limitation order by the War Production Board on bronze case water meters. Rust-proof cast iron and molded glass have been substituted for bronze in the outer shell, register box and register lid, making possible a construction in which over 70 percent of the bronze normally used in a meter of this size has been eliminated. The inner working mechanism requires only a small quantity of critical material. The meter is made in sizes from ⅝ in. by ¾ in. up to and including 2 in.—*Pittsburgh Equitable Meter Co., 400 N. Lexington Ave., Pittsburgh, Pa.*



Shears

Both 16-gage and 18-gage Lectro shears have been redesigned by Black & Decker Mfg. Co. to improve ease of han-

Suggestions for obtaining improved results in Oxy-Acetylene Bevel-Cutting

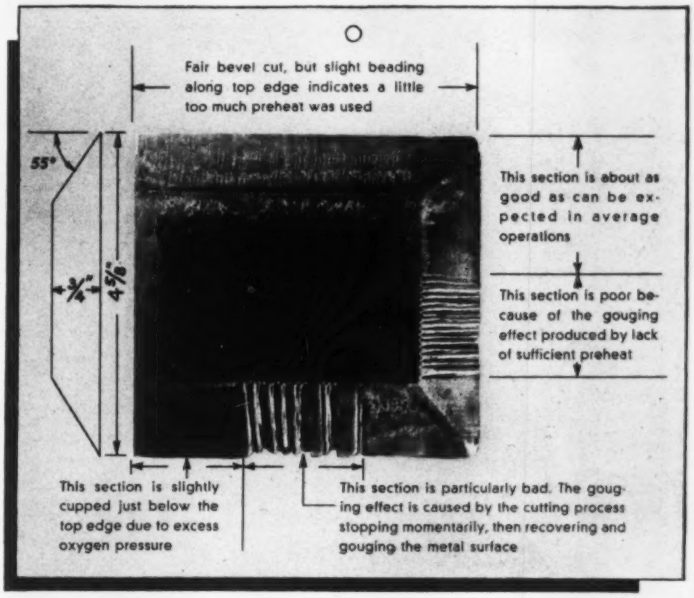
IN the preparation of plate edges by means of oxy-acetylene flame-beveling, accurate adjustment of the preheat flames—as well as correct cutting speeds and nozzle sizes is extremely important in obtaining uniformly good results. Illustrated at the right are some test bevel-cuts which show this better than words can describe. To help operators do consistently good work, large-size wall charts showing these test cuts are available from any Linde office, without charge.

More Preheat Required

In many cases, poor bevel-cutting results are directly due to insufficient preheat. The reason that more preheat is required for bevel-cutting than for vertical-cutting is that, with the nozzle at an angle to the plate surface, the heat tends to "bounce off" and does not soak in to the same extent as when the preheat flames strike the plate at right angles. The flatter the angle, the greater the amount of preheat required.

How to Increase the Preheat

For beveling angles up to 45 degrees, sufficient preheat can be obtained with standard nozzles by slightly "forcing" the preheat flames. For very shallow angles, it is sometimes necessary to provide supplementary preheat, either with a second blowpipe, or by first going over the line to be cut with the preheat flames of the cutting blowpipe.


Fair bevel cut, but slight beading along top edge indicates a little too much preheat was used
55°
¾"
4⅝"
This section is about as good as can be expected in average operations
This section is poor because of the gouging effect produced by lack of sufficient preheat
This section is slightly cupped just below the top edge due to excess oxygen pressure
This section is particularly bad. The gouging effect is caused by the cutting process stopping momentarily, then recovering and gouging the metal surface

You can obtain a large-size (9 by 11 inches) wall chart of the above cutting guide from any Linde office, upon request. Ask for Form 5067.

●

Nozzle Size and Pressures

In bevel-cutting, the actual *depth* of the cut should be considered, rather than *plate thickness,* when selecting the nozzle, and when setting gas pressures and cutting speeds. The Instructions which came with your blowpipe will guide you in this. Duplicate copies of Instructions for apparatus supplied by Linde can be obtained from any Linde office.

FOR VICTORY
BUY
UNITED STATES
WAR
BONDS
AND
STAMPS

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

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LINDE OXYGEN . . . PREST-O-LITE ACETYLENE . . . UNION CARBIDE
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The words "Linde," "Prest-O-Lite," "Union," "Oxweld," "Purox," and "Prest-O-Weld" are trade-marks of Units of Union Carbide and Carbon Corporation.

..... How much do YOU pay for repairs to broken hydrants?

$50 $10

WHEN ordinary designs of fire hydrants are broken by an automobile out of control or a heavy truck, the entire standpipe must be replaced, requiring a lengthy and costly repair job. Reports from all over the country indicate that this expense averages well over $50.00 for such hydrants.

On the other hand, the Kennedy SAFETOP, while fully as strong and as resistant to ordinary impacts as a one-piece hydrant, limits breakage from smashing impacts to inexpensive, easily replaceable parts.

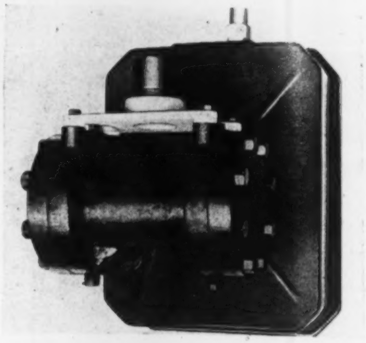
If a Kennedy SAFETOP is struck in an impact which *no* hydrant would resist, the only parts which are broken are a standpipe breaking ring and stem coupling located a few inches above the ground level. No water is lost; and the entire repair job can be done by one man, within half an hour, without excavating, and at a total cost of less than $10.00 for all repair parts and also labor.

Many thousands of Kennedy SAETOPS are in service; and the water department superintendents responsible for them are enthusiastic about their dependability, easy operation, and low maintenance cost.

THE KENNEDY VALVE MFG. CO.
ELMIRA, N. Y.

KENNEDY
SAFETOP FIRE HYDRANT
REG. U.S. PAT. OFF.

dling and operating characteristics. The No. 18 Lectro-Shear has been reduced in outer dimensions, so that the motor housing forms a comfortable operating handle. This greatly reduces the length and weight of the tool, and vastly improves the operating balance and control. The power and capacity of the tool are the same as in previous models. The larger No. 16 Lectro-Shear has been equipped with an improved operating handle to give it better balance and easy control on curved and irregular lines.—*Black & Decker Mfg. Co., Towson, Md.*



Aneroid Manometer

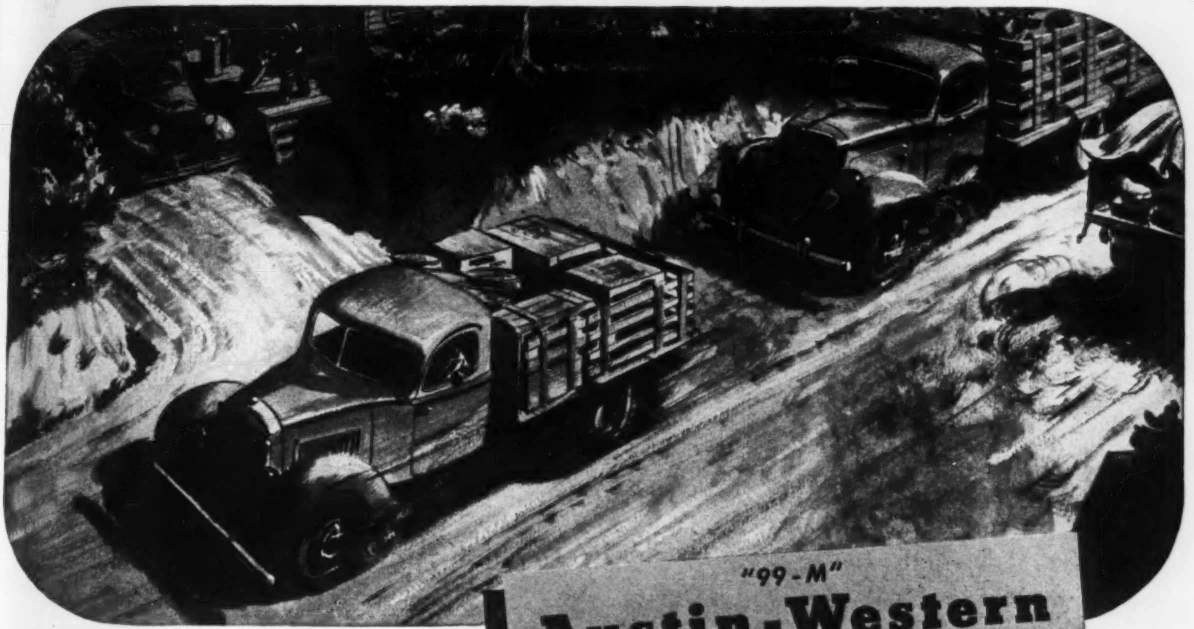
The absence of mercury or other liquid from this latest development of the Taylor Instrument Companies removes the possibility of product contamination and the hazard of mercury being blown due to line curves or carelessness. Further advantages claimed are that sealing liquids are rarely required and vital mercury is released for the war effort. Replacing the stuffing box is a new torque tube assembly which gives a completely closed system and is designed so as to eliminate friction and lubrication. Metal bellows respond to the pressure variations and insure faster response under ordinary circumstances with immediate reaction to sudden changes in flow. — *Taylor Instrument Companies, Rochester, N. Y.*

Helps Pre-fabricated Houses

A special paint system for use on prefabricated housing units has been developed by the Arco Company. Paints used in their new "Pre-fab" system consists of a rapid drying shop coat which can be used without a preliminary sealer, on plywood, ordinary lumber or manufactured board, and a quality lead, zinc, and oil field coat. The material used for the shop coat provides a superior surface for the finished coat and does not deteriorate if unfavorable weather conditions or scarcity of labor causes delay in application of the finish coat at the building site.—*The Arco Co., Cleveland, Ohio.*

● America's unmatched system of strategic and secondary highways is playing an important part in the war effort. Road builders have every right to be proud of the part they have played in making possible the speedy movement of men and materials so essential to victory.

KEEP ROADS UP TO "KEEP 'EM ROLLING"



"99-M"

Austin-Western

POWER GRADER

Keep On Top of Your Maintenance Program With a "99" LOADER

Hooked up to your A-W "99" or "99M", this efficient Loader saves time and money (1) where high sod shoulders must be worked to prevent accumulation of surface water; (2) where excess dirt in ditches or on wide shoulders must be removed.

Write for Full Details

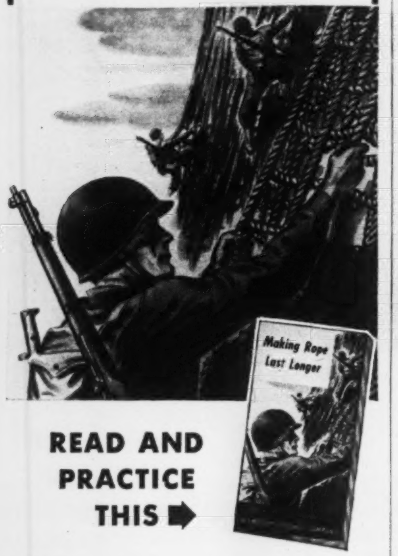
● Roads are playing an increasingly vital part in America's Victory Program . . . serving the armed forces by enabling farms and factories to deliver the goods that "keep 'em rolling." That's why it's so important that all available machinery be kept fit for full time maintenance work.

You who own A-W machines have the advantage of the extra durability that's built into them. But you can't be sure even this rugged equipment will outlast the emergency unless you have it serviced promptly and regularly.

Consult your nearest Austin-Western dealer for helpful, constructive advice on how best to conserve your road maintenance equipment. Let him help you "keep 'em rolling." THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois.

MOTOR GRADERS • BLADE GRADERS • ELEVATING GRADERS • SCRAPERS • CRUSHING AND SCREENING PLANTS • ROLLERS
ROLL-A-PLANES • MOTOR SWEEPERS • SHOVELS AND CRANES • SCARIFIERS • DUMP CARS • TRAIL CARS

TO GIVE THESE BOYS ENOUGH ROPE



READ AND PRACTICE THIS ➡

FREE! *Send Coupon Below*

As you well know, Manila Rope is so scarce that even all the formerly thought "must" requirements of our armed forces, marine and war industries cannot be filled.

Everyone of us can be a "Donald Nelson" when it comes to rope supplies. (1) Take care of rope and it will last longer, and (2) use Plymouth "Wartime" Rope, instead of Ship Brand Manila, whenever you can. You will find it to be a satisfactory substitute for most uses. PLYMOUTH CORDAGE COMPANY, North Plymouth, Massachusetts *and* Welland, Ontario.

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THE *Rope* YOU CAN TRUST

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Please send your free booklet, "Making Rope Last Longer."

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Manufacturer's Activities

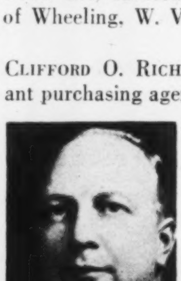
Personnel changes and new plans

The industrial products and equipment sales department and the oil field equipment sales department of INTERNATIONAL-STACEY CORP. (International Derrick & Equipment Division) have been combined and will operate under the direction of W. FERGUSON BARNES (left), general manager of sales, and J. M. AITKEN (right) assistant manager of sales, both having headquarters at Columbus, Ohio. Mr. Barnes formerly was manager of the industrial products and equipment sales department, and Mr. Aitken has served as vice president of INTERNATIONAL DERRICK & EQUIPMENT Co. of Ohio.

FRANK S. DUNHAM, 66, one of the pioneer members of the field engineering staff of the PERMUTIT Co., died at Chicago July 23.

HANDY & HARMAN have been awarded the new joint Army-Navy Production Award for high achievement in the production of war equipment. The award, recently established to supplant Navy "E", Army "A" and Army-Navy Star Awards, came from James V. Forrestal, Under-Secretary of the Navy.

MEYER YANOWITZ of Sharon, Pa., has been elected president of the SHARON TUBE Co., succeeding HENRY D. SCOTT of Wheeling, W. Va.



CLIFFORD O. RICHARDS, formerly assistant purchasing agent, has been appointed purchasing agent for the TAYLOR-WHARTON IRON & STEEL Co. He succeeds R. C. Schaeffer, who resigned recently. Before joining Taylor-Wharton in January, 1941, Mr. Richards was with the FITZ CHEMICAL Co. He will make his new office at the Taylor-Wharton plant in Easton, Pa.

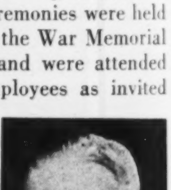
C. GRANNISS BONNER, formerly comptroller and more recently treasurer of the BRUNSWICK-BALKE-COLENDER Co. of Chicago, has been elected treasurer of POMONA PUMP Co., Pomona, Calif. Mr. Bonner relieved DONALD C. MCKENNA, vice-president and former treasurer, who will devote full time to the increasing production activities of the company's four plants.

Promotion of S. S. WROBLESKI, formerly of Akron, to the post of personnel manager of the GOODYEAR ENGINEERING CORP., in Charlestown, Ind., has been announced.

LEO F. HELLER, former secretary of the Youngstown, Ohio, Builders Association, has been appointed director of labor relations for the AMERICAN SHIPBUILDING Co.

WILLIAM T. SANFORD has been appointed service manager of the railroad division of the BUDA Co. of Harvey, Ill.

JOHN M. BROWN, 54, founder of the ELECTRICAL REPAIR & SERVICE Co., Birmingham, Ala., died there July 27.



For outstanding achievement in the production of turbines, gears, pumps and other equipment vital to the United States Navy, the coveted Navy "E" burgee, was presented to the DELAVAL STEAM TURBINE Co. recently. The presentation ceremonies were held in the War Memorial Building at Trenton, and were attended by 1,800 DeLavel employees as invited guests. On hand to receive the award for the company were H. L. WATSON (left), executive vice president, and H. W. JOHNSON (right), vice president and works manager. During the ceremonies, it was announced that the production of equipment for the Navy by the company during the first four months of 1942 ex-

SAN VICENTE DAM *Speeded Up* WITH 20 *Easy Holding* JB-5 JACKHAMERS AND 10 FM-2 WAGON DRILLS

The San Vicente Dam in California, part of a long-range program to provide water facilities for the district, had to be speeded up to take care of the rapidly increasing war industries in that locality. The rock formation was extremely difficult to drill. In some places a steel would go eight feet; in others, only a few inches.

Speed on this project was of prime importance to the war effort. To cope with the tough drilling problem and to speed up the work, L. E. Dixon, the contractor, used 20 Ingersoll-Rand JB-5 Jackhamers and 10 FM-2 Wagon Drills. Because of their easy-handling qualities, these machines were well-liked by the operators. Their dependability and durability were thoroughly proved throughout the job.

Fast, dependable Ingersoll-Rand Rock Drills are used all over the country on jobs such as this —jobs so vital to our war work.

Keep 'em Drilling

Ask your supplier for an oil that meets I-R Specification 433 —the new rock drill lubricant developed by Ingersoll-Rand.

5-168

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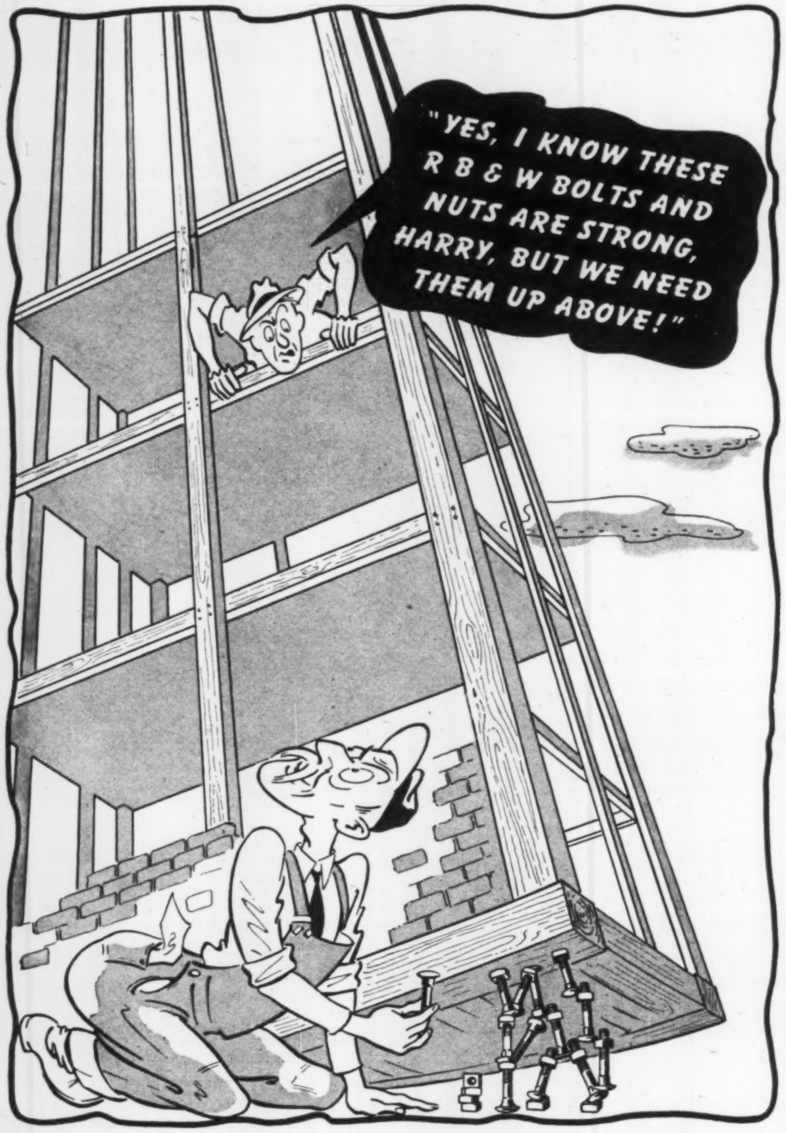

"YES, I KNOW THESE R B & W BOLTS AND NUTS ARE STRONG, HARRY, BUT WE NEED THEM UP ABOVE!"

Use R B & W Bolts and Nuts . . .

Quick-starting, quick-tightening because they are accurately, uniformly sized and threaded — and carefully inspected.

Vibration-resisting, shock-resisting because the manufacturing method insures extra strength, and all processing is controlled from raw rod to finished product.

EMPIRE BOLTS NUTS RIVETS

AND ALLIED FASTENING PRODUCTS . . . SINCE 1845

RB&W Making strong the things that make America strong

RUSSELL, BURDSALL & WARD BOLT & NUT COMPANY

Factories at Port Chester, N. Y., Rock Falls, Ill., Coraopolis, Pa.
Sales offices at Philadelphia, Chicago, Detroit, Chattanooga, Los Angeles, Portland, Seattle

ceeded in equivalent man hours the entire production of the organization during World War I.

The address of the TEST PLUG MANUFACTURING Co., manufacturers of plugs that test and plug any kind of pipe of any make up to 300 lb. air or hydraulic pressure, is LECLAIRE AND CAROL AVENUES, NILES CENTER, ILL. In *Engineering News-Record* June 18 issue, the company's address was erroneously printed as Niles Center, Ohio.

M. G. ENSINGER, president of the UNION WIRE ROPE CORP. of Kansas City, Mo., is shown speaking over a radio network in connection with the recent award of the Navy "E" citation to his firm. The company was said to be the first in Kansas City to receive the pennant.

THE FOXBORO CO. of Foxboro, Mass., makers of measuring and controlling instruments was awarded the Treasury Department's Minute Man flag recently in recognition of payroll allotment subscriptions by over 95 percent of its employees.

H. B. JORDAN, vice-president in charge of operations, was on hand recently when the Worcester, Mass., plants of the AMERICAN STEEL & WIRE CO. were awarded the Navy "E" burgee, awarded for excellence in production. A crowd of 3,500 employees of the company filled the Worcester Memorial Auditorium to watch Rear Admiral Wat T. Cluverius present the flag.

The firm of KEUFFEL & ESSER, pioneer manufacturers of drafting material, surveying equipment and fire control instruments, July 20 observed its 75th anniversary by presenting each of its employees with a $25 war bond and a commemorative booklet entitled "Through the Years." Only a brief pause between working shifts was taken to commemorate the company's birthday.

STANLEY P. DEAS has been appointed as secretary-manager of the SOUTHERN PINE ASSOCIATION of New Orleans, La. Mr. Deas succeeds PETER C. GAFFNEY, JR., who recently entered the Army.

WORTHING H. STONE has become assistant advertising manager in charge of rail-

YOU CAN'T *Begin* CONSTRUCTION
without Fuel, Water and Air Lines

GET STARTED QUICKER WITH

ROLAGRIP

PIPE COUPLINGS

FOR PLAIN END PIPE

First requisites of any wartime construction job are lines for fuel, water and air. The quicker these lines are installed — the quicker the project can be started. Lines are installed in minimum time, when you use Rolagrips with plain end pipe for leakproof connections.

Rolagrips automatically accommodate expansion and contraction of the line; accommodate considerable misalignment.

No Threading, Grooving or Welding Necessary

Rolagrips are quickly and easily assembled; only two identical half housings, two bolts and a synthetic gasket. No special tools required. Lightweight pipe may be used, as none is cut away. Coupling can be completely salvaged. Write to nearest address for full information.

ROLAGRIPS are being used in much Wartime Construction and at Victory Projects.

G·B MFG. CO.

GUSTIN-BACON MFG. CO.

KANSAS CITY, MO.

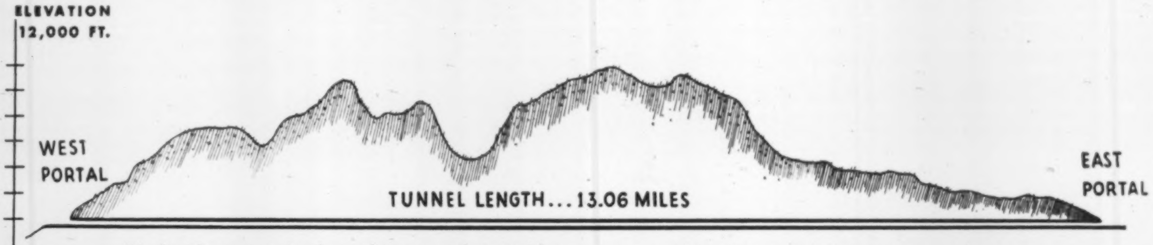
Chicago New York San Francisco Tulsa Fort Worth Houston

DU PONT
REG. U.S. PAT. OFF.

CONSTRUCT

Continental Divide Tunnel 65% Completed...

DU PONT "GELEX"* AND DELAY ELECTRIC BLASTING CAPS PLAY IMPORTANT PART IN DRIVING ONE OF LONGEST TUNNELS EVER BUILT WITHOUT SHAFTS



Under the mountains from the east and west sides, men are working day and night to construct the great Continental Divide Tunnel. Its circular bore is 9¾ feet in diameter, and the gradient is 8⅓ feet per mile.

Loading lifter holes with "Gelex" No. 2 in the Granby Diversion Tunnel. Good water resistance of "Gelex", combined with excellent fragmentation and minimum noxious fumes make it satisfactory for use in place of the more expensive gelatins on many jobs of this type.

Seven thousand feet below the towering peaks of the Continental Divide a great tunnel, 13 miles long, is being driven through solid rock.

It will divert an average annual flow of 320,000 acre-feet of much needed irrigation water from a watershed on the western slope of the Rockies to fertile land on the eastern side. America, at war or at peace, will benefit from the increased acreage for crops and livestock . from power made available for development of lower-grade ores and industrial production.

This tunnel—now 65% completed—will require in all the drilling of over 3,000,000 feet of boreholes, removal of more than 800,000 tons of rock, and the use of over 2,000,000 pounds of dynamite. Yet, despite its magnitude, tunnel crews are making such excellent progress that the project will undoubtedly be completed ahead of schedule.

S. S. Magoffin, Inc. is driving from the east portal, using Du Pont "Gelex" No. 1 and No. 2—two semi-gelatin dynamites ideal for this work because of their economy, good water resistance, minimum noxious fumes, and a high velocity of detonation that insures good fragmentation. This firm is also using Du Pont Delay Electric Blasting Caps exclusively on the job—over 190,000 having been shipped to date. At the western end, John Austin, of Carlton Tunnel fame, is in charge for Stiers Bros. Construction Co.

On another phase of this project—the Granby Dam Diversion Tunnel—Platt Rogers, Inc. has done a masterful job in winter temperatures of 40° below zero and lower. Here, again, Du Pont "Gelex" No. 2 is the blasting agent and Du Pont Delay Electric Blasting Caps are used exclusively for its detonation.

*Trade Mark

ON TOPICS

Information for contractors about Du Pont Explosives, "Ventube" and "CZC"

HOW TO STORE "VENTUBE" FOR LONG LIFE

You can assure the greatest possible life from "Ventube" by proper storage methods when it is not in use. All "Ventube" should first be cleaned both inside and outside with clear water, and hung up to dry thoroughly. Then it should be folded carefully into a neat bundle. Wrinkles and creases should be avoided.

"Ventube" should be stored in a cool, dry place away from sunlight and heat. Avoid the use of gasoline, naphtha or other cleaning agents containing solvents harmful to rubber. When these precautions are observed, the high-quality construction of "Ventube" will enable you to use and re-use it many times with excellent results.

DID YOU KNOW?

... **THAT** there is no such thing as *dry* rot? Dampness promotes decay, but wood can be either so wet or so dry that fungi will not attack it. For dependable protection against decay, specify treatment with "CZC".

... **THAT** the entire method of installing the "Ventube" system was developed by one of America's foremost mining engineers in his own mine?

... **THAT** the Blasters' Handbook, published by Du Pont, is the only reference book of its kind issued in the United States.

Re-use of "Ventube" aids conservation*

THIS PHOTO illustrates a big advantage of "Ventube" today when prevention of waste is a national need. It shows several sections of "Ventube" being rolled up to be kept for the next job. For "Ventube" is not a one-job product. It is the result of painstaking research to develop the most efficient type of fabric and the toughest impregnating and coating compounds.

To insure the life of the tubing under all operating conditions, the fabric has been chemically treated to resist heat, moisture, mildew and decay, acids, alkalis and gases.

As another aid to conservation, Du Pont has developed a special patching cement and cloth, which makes it easy to patch "Ventube" securely. If, by accident, you drill a hole through it or burn it with an acetylene torch, the puncture can be repaired quickly and the "Ventube" put back in service immediately.

Proper storage also helps you get the most out of "Ventube," as explained in the article on this page. Further information is contained in the new "Ventube" handbook. Copies are available from E. I. du Pont de Nemours & Co. (Inc.), "Fabrikoid" Division, Fairfield, Conn.

**"Ventube" is Du Pont's registered trade mark for its rubber impregnated flexible ventilating duct.*

"CZC" treated lumber helps to conserve vital metals

More and more contractors today are solving priority problems by using "CZC" treated lumber to replace metal. Treated lumber cuts costs ... saves time in transportation and construction.

For "CZC" treated lumber has all the excellent properties of untreated lumber plus outstanding qualities of its own. "CZC" (Chromated Zinc Chloride) gives lumber dependable protection against decay, repels termites and makes it fire resisting to a measurable degree.

"CZC" treatment permits the use of less expensive, less naturally durable woods which become more lasting when treated, than the better grades untreated. Properly treated wood suffers no loss of strength—the same values for load and stress calculations are applied as designated fot corresponding untreated wood.

For further particulars on money-saving uses of "CZC" treated lumber, send for your copy of "Facts About Lumber Pressure Treated With Du Pont 'CZC'." E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Department, Wilmington, Del.

★ **E. I. DU PONT DE NEMOURS & COMPANY (INC.), WILMINGTON, DELAWARE** ★

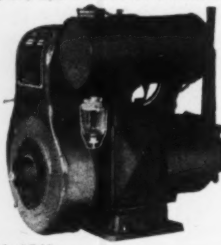
NO WATER HAZARDS with WISCONSIN-POWERED Equipment

This is no time for production in any line to lag or sag . . . where there's important work to be done. Engine water hazards cause work-hour casualties that are needless and wasteful.

Equipment powered by Wisconsin heavy-duty air-cooled engines never suffers from water-boiling dry-ups in summer or freeze-ups in winter. There is no danger of the cooling system springing a leak from vibration or clogging up with dirt.

Air-cooling is never dependent on forgetful human beings . . . or the constant availability of water. Wisconsin Engines also provide HEAVY-DUTY SERVICE as a plus value.

MOST
POWER
Per
POUND



Model ADH
Single cylinder air-cooled engine. 3 to 5 hp. Other types and sizes, 1 to 35 hp.

WISCONSIN MOTOR
Corporation
MILWAUKEE, WISCONSIN, U. S. A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines

DREDGING

Filling, Land Reclamation, Canals and Port Works

River and Harbor Improvements
Deep Waterways and Ship Channels

We are equipped to execute all kinds of dredging, reclamation and port work anywhere in the United States

Contractors to the Federal Government

Correspondence invited from Corporate and Private Interests Everywhere

Largest Plant — Longest Experience

Atlantic, Gulf and Pacific Co.

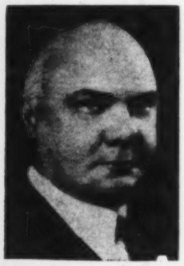
21 Park Row
New York

Houston, Texas
Scanlon Bldg.

road, farm implement, automotive and rock bit divisions of the **Timken Roller Bearing Co.** **S. L. Huffman** has been advanced to manager of the news bureau.

Ralph B. Meisenhelder, assistant to the president of the **York Ice Machinery Corp.**, has been appointed director of war contract progress. His duties will consist of coordination and liaison responsibilities within the sales, engineering, manufacturing, administrative and war material divisions, according to **S. E. Lauer**, president of the corporation.

Arthur T. Clark, manager of the **Water and Sewage Works Manufacturing Association**, has reported the following changes in the association's officers, effective on Nov. 1: **Dan S. McAfee**, of **The Dorr Co.**, becomes president; **Charles A. McGinnis**, of the **Johns-Manville Co.**, vice president; and **Edgar J. Buttenheim**, The American City magazine, takes office as treasurer. The following member companies have been added to the Board of Governors: **Johns-Manville Co.**, **Mathieson Alkali Works, Inc.**, **Roberts Filter Mfg. Co.**, **Simplex Valve & Meter Co.**, and **R. D. Wood Co.** New member companies on the waterworks division executive committee are: **Builders Iron Foundry**, **Hershey Mfg. Co.**, **Ross Valve Mfg. Co., Inc.** On the sewage works division executive committee the following member companies will be added: **Link Belt Co.**, **Nichols Engineering & Research Corp.**, and Sewage Works Engineering magazine.

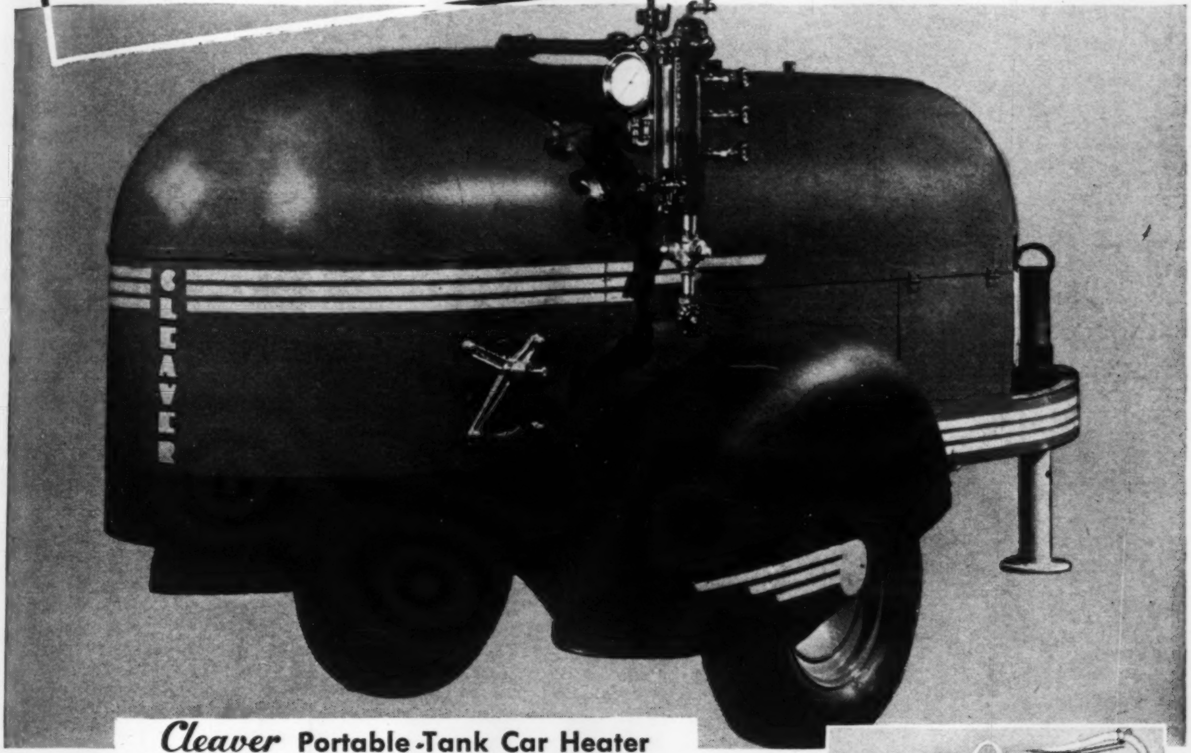


Robert F. Runge, vice-president of **SKF Industries, Inc.**, died July 6 in Germantown (Pa.) Hospital. He was 56. His entire business career was spent with SKF and its predecessor, the Hess-Bright Manufacturing Co. He became SKF's vice-president in 1920, was a trustee of Drexel Institute, and a former president of the Metal Manufacturers' Association.

To further aid the national program of truck conservation being sponsored by the Office of Defense Transportation, **Mack Trucks, Inc.** is offering free buttons to drivers and mechanics who sign the U. S. Truck Conservation Corps pledge. In these pledges they declare their inten-

Cleaver

...THE BEST KNOWN NAME IN HEATING EQUIPMENT FOR BITUMINOUS MATERIAL IN TANK CARS AND STORAGE TANKS



Cleaver Portable-Tank Car Heater

The Cleaver Portable Tank Car Heater — a high pressure, oil-fired, compact and mobile heater available in two and three tank car sizes. Famous Cleaver design boiler with four-pass flue travel assures most economical operating costs. Turbine type condensate return system operates without loss of water from car coils.

Cleaver Portable Pumping Booster

Cleaver Portable Pumping Booster — withdraws pumpable bituminous material from car — heating by direct firing to application temperature in one operation. Raises car temperature 50 degrees per hour. Available in three sizes — on truck mounting or 4-wheel trailer.

Tank car heaters and bituminous boosters were pioneered by Cleaver — hundreds of them are in nation-wide use today. Their superior performance is achieved through the original, exclusive Cleaver four-pass, down-draft flue travel and integral burner construction.

When you need to heat — circulate — pump all grades and kinds of bituminous materials in tank cars or storage, there is a Cleaver Tank Car Heater or Pumping Booster to do the job faster, with substantial savings of fuel, time and money. Write for complete information.

CLEAVER-BROOKS CO., 5107 N. 33rd St., Milwaukee, Wis.

Our "Victory" effort comes first! Greatly enlarged Cleaver-Brooks manufacturing facilities are going "around the clock" for military production.

Pioneer Builders of Heating Equipment for Bituminous Materials in Tank Cars and Storage Tanks . . . Cleaver Heaters and Boosters . . . Aggregate Heaters and Dryers . . . Cleaver Automatic Steam Plants

3 reasons why you need
★ Smith ★
AIR COMPRESSORS

1

PORTABILITY

Think of the many advantages of such a lightweight, portable compressor! Move it easily from one job to another. Tow it at permissible truck speeds.

2

DEPENDABILITY

Made with FORD MOTORS and standard parts. Its ruggedness and efficiency are sources of constant satisfaction to users everywhere. Repairs and parts available at any Ford garage.

3

ECONOMY

Priced far below standard compressors of equal capacity. 60 cu. ft. size uses only 1 gal. of gasoline an hour!

Act Now!

The Smith has all the power you'll need for a majority of air-compressor work. Why let large cumbersome compressors produce a costly bottleneck for you?

With a Ford Motor and shop facilities you can assemble your own Smith Compressor. We will furnish a Smith Compressor Head and Accessories with complete instructions for mounting.

Write for free Booklet

GORDON SMITH & CO.
INCORPORATED
430 College St. Bowling Green, Ky.

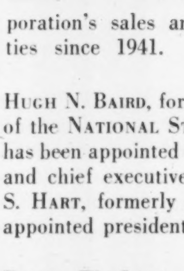
tion to prolong the life of trucks by seeing that all minor adjustments and repairs are promptly taken care of, and by cooperating in the national preventive maintenance program now under way. A button, 1¼ in. in diameter, attractively colored in red, white and blue, is given on signing of the pledge.

Robert W. Wolcott, president of the Lukens Steel Co. is chairman of a newly formed American Industries Salvage Committee, representing groups of leading industrial concerns working with the conservation division of the War Production Board to help speed collection of vital scrap materials, Other members of the administrative committee are Charles R. Hook, president of the American Rolling Mill Co., vice-chairman; R. S. Wilson, representing the Rubber Manufacturing Association; and O. E. Mount, representing the Steel Founders' Society of America.

W. G. Hannam, 57, of La Center, Washington, northwest sales manager for the Cleveland Tractor Co., died recently after a brief illness.

Charles Stewart Roach, 46, engineer for the International Stacey Corp., Columbus, Ohio, died there July 20.

Busier than ever before attempting to maintain America's ship transportation facilities, the Ayer and Lord Marine Ways at Paducah, Ky., celebrated a century of inland waterways service in July. The company is a subsidiary of the Wood Preserving Corp.



Dan C. Hungerford has resigned as vice-president and director of the Elastic Stop Nut Corp. of Union, N. J. He joined the corporation in 1936 as field engineer, and later was chief engineer. He has been in charge of the corporation's sales and advertising activities since 1941.

Hugh N. Baird, formerly a vice president of the National Steel Car Corp., Ltd., has been appointed chairman of the board and chief executive officer; and Robert S. Hart, formerly a vice president, was appointed president of the organization.

Elmer W. Silver, secretary, has been

Better Work—
FASTER!

WITH VIBER VIBRATION

Viber Vibrators, proved on scores of big jobs, are making history today on war construction, because they *speed up concrete work*. New models are completely interchangeable for gas, electric and air operation.

There is a Viber Vibrator specifically designed for every type of concrete construction.

• FLEXIBLE ELECTRIC VIBRATOR

Made in 2⅛" and 3" diameter with 12 ft. and 21 ft. flexible shaft. Complete interchangeability — Flexible Casings, Cores, Vibrators. Universal type motor. Built-in protective "ground."

NEW CATALOG describes latest line of Viber Vibrators. Send for your copy today.

VIBER COMPANY
726 SO. FLOWER STREET
BURBANK, CALIFORNIA

SIMPLE AS A·B·C

THEY SIMPLIFY JOB-PROGRESS

STERLING WHEELBARROWS offer the simplest, low-cost method of transporting materials . . . require no skilled labor . . . can use any available man-power . . . and permit any man to do a better day's work, always, because these are "Easy Wheeling" barrows. STERLINGS are veterans of long, successful service in fields of engineering, construction and industry in general. Ruggedly built to take 24-hour punishment seven days a week . . . dependable NOW, as usual!

STERLING WHEELBARROW CO., MILWAUKEE, WIS.

Sterling S
Look for this Mark of STERLING Quality
WHEELBARROWS

elected treasurer of the **International Nickel Co., Inc.**, succeeding the late William L. Rianhard. Mr. Silver will also continue as secretary.

William N. Matthews, president of the **W. N. Matthews Corp.**, electrical equipment manufacturers of St. Louis, Mo., died July 19. He was 74.

P. C. Sowersby, assistant advertising manager for G. E. Lamp Department at Nela Park, Cleveland, has been transferred to the company's Michigan division in Detroit. There he will specialize in the advancement of wartime lighting designed to increase production of war goods manufactured in the Michigan industrial area.

Charles Meirs Denise, former general manager of sales, fabricated steel construction, **Bethlehem Steel Co.**, died recently at his home in Bethlehem, Pa.

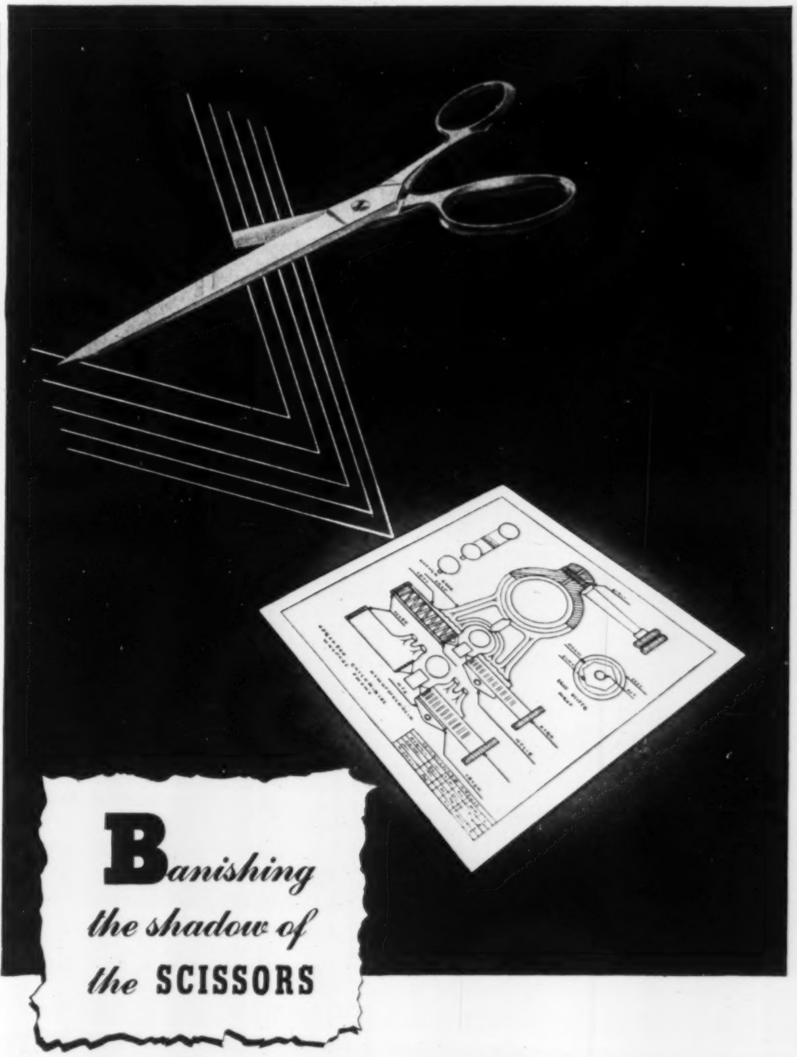
Frank M. Boylan has joined the **Buda Co.**, of Harvey, Ill., as a field representative in the industrial division handling railroad products and lifting jacks.

F. H. Lindus, who has been handling various advertising assignments for the **Timken Roller Bearing Co.** in Canton, Ohio, for the past year, has been returned to the sales department of the company's service division and is now located in the San Francisco branch.

Deloss Cummins has been appointed service manager for the **Cummins Engine Co.**, replacing **Robert Stratton**, who recently was commissioned in the U. S. Signal Corps. Affiliated with the company since its inception, Mr. Cummins started on its assembly line in 1915, worked up to factory superintendent in 1924 and filled this position until his transfer to the service department in 1929.

The appointment of **R. J. Hearn** as assistant manager of the Boston district office of the **Crocker-Wheeler Electric Mfg. Co.** has been announced.

Admiral **Emory S. Land**, chairman of the United States Maritime Commission, presented triple Maritime Commission honors to the management and workers of the



Waste—waste—waste! Thousands of dollars going into the waste box in blue print departments . . . countless hours uselessly spent in trimming prints to size. That's what Bruning set out to eliminate in making it possible to produce BW (black line) prints in place of blue prints, in large volume *without* trimming.

And so today, all industry avoids waste . . . speeds production . . . by using Bruning Black and White Prints, *cut to the exact size of their tracings.* In addition, BW (black line) Prints are easier to read and check than blue prints.

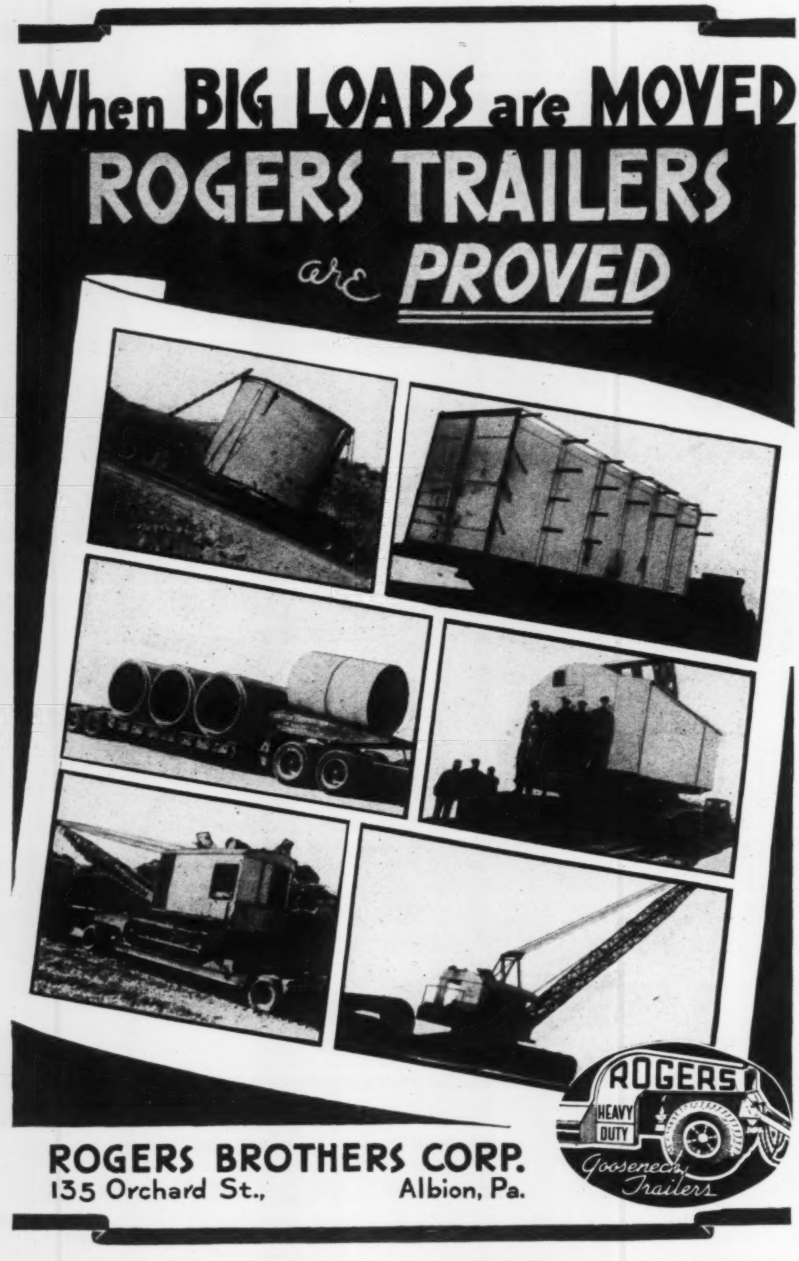
That's only *one* of the many ways Bruning research speeds and simplifies drafting and reproduction processes. Upon such a policy of service to the customer Bruning has built a business which today is a nation-wide organization, dedicated to the policy that the user's interest comes *first.* Charles Bruning Co., Inc.

2067—227

Since 1897 **BRUNING**

NEW YORK • CHICAGO • LOS ANGELES
Branches in 13 Principal Cities

SPEEDS—SIMPLIFIES—AND PROTECTS A NATION'S DRAFTING


When BIG LOADS are MOVED
ROGERS TRAILERS
are PROVED

ROGERS BROTHERS CORP.
135 Orchard St., Albion, Pa.

FINE GEARS of All Types and Sizes

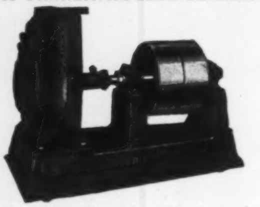
Spur Gears—½ in. to 30 ft. in diameter
Bevel Gears—½ in. to 13 ft. in diameter
Spiral Gears—½ in. to 10 ft. in diameter
Worm Gears in any practical size.

Fast Delivery—Fair Prices

THE EARLE GEAR & MACHINE CO.
4717 Stenton Ave. Philadelphia, Pa.

EARLE GEARS

ERIE
BELT DRIVEN DREDGE PUMPS WITH TIMKEN ROLLER BEARINGS


All Thrust Troubles Eliminated
Sizes From 2" to 12"
Write for New Bulletin No. 45
ERIE PUMP & ENGINE WORKS
152 Glenwood Ave. Medina, N. Y.

BETHLEHEM-FAIRFIELD SHIPYARD, at Baltimore, Md. recently. The yard received the Maritime "M" pennant and the Maritime Commission Victory flag, while workers were given the commission labor merit award insignia.

HARRY J. LESCHEN, 63, president of A. LESCHEN & SONS ROPE CO., of St. Louis, Mo., died August 2. He was president of the National Wire Rope & Strand Manufacturers Association between 1933 and 1941.

CHARLES MILLER, associated with RALPH C. COXHEAD, VARI-TYPER CORP., New York, since 1936, has been appointed factory superintendent. Mr. Miller has been serving as machine parts division foreman since January. Prior to this he was in the research and experimental division.

JAMES F. MCNAMARA, mill products sales manager of the INTERNATIONAL NICKEL CO., has been made chairman of the board of directors of HARVILL AIRCRAFT DIECASTING CORP.

W. R. NORTHLICH, formerly an account executive with the BUCHEN CO., Chicago, has been transferred from the Toledo general office of OWENS-CORNING FIBERGLAS CORP., to the company's Washington, D. C. office.

The appointment of VICTOR H. LAWRENCE as general superintendent of the Otis Works of JONES & LAUGHLIN STEEL CORP. at Cleveland, Ohio, has been announced. Mr. Lawrence, who studied civil engineering, is a graduate of the Carnegie Institute of Technology and the Graduate School of the University of Pennsylvania. Since 1917 he has been engaged in the construction, operation, engineering and metallurgical phases of steel manufacture, with several companies. He joined the OTIS STEEL CO. as assistant to the president in 1941.

The FLEXCELL CO. has announced that the new location of its general offices is 120 So. LaSalle St., Chicago, Ill.

WALTER M. CHARMAN, president of the FERRO ENGINEERING CO., of Cleveland, Ohio, has announced the election of GUSTAVE A. PETERSON as vice president.

NEW PUBLICATIONS

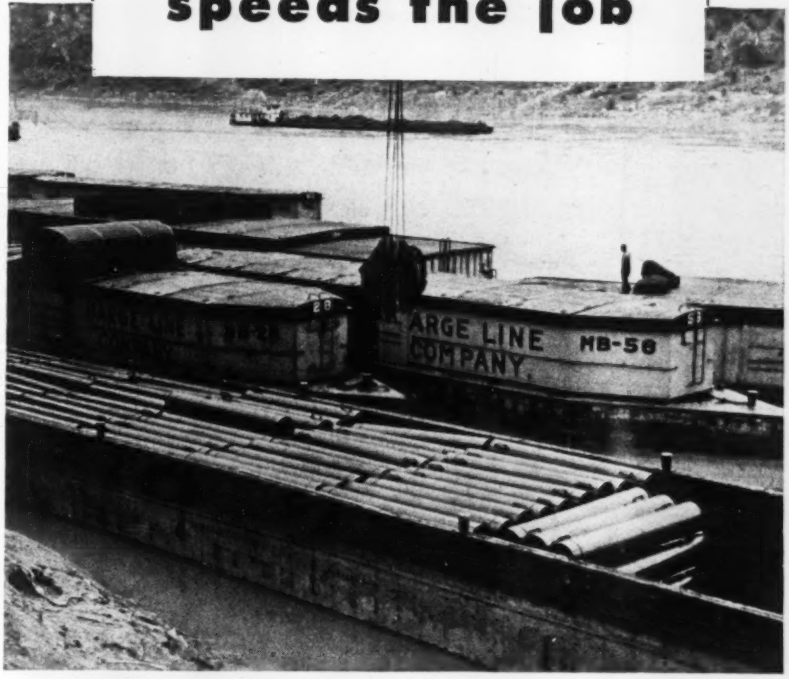
Waterproofing Concrete—A new Medusa Portland Cement Co. booklet entitled "How to Waterproof Concrete, Stucco and Masonry," has just been issued. This booklet explains how lack of waterproofing causes water damage to buildings, the various methods of waterproofing, and the advantages of integral waterproofing in preventing water damage. The reader is given specifications for the waterproofing of concrete and stucco.—*Medusa Portland Cement Co., 1000 Midland Bldg., Cleveland, Ohio.*

Hoists—A new General Catalog No. G-6, dated June 1, 1942, has been made available by the Coffing Hoist Co. In condensed form it contains information, specifications and prices on the company's complete line of ratchet lever hoists, electric hoists, spur geared chain hoists, differential chain hoists, I-beam trolleys, load binders and utility maintenance tools.—*The Coffing Hoist Co., Danville, Ill.*

Making Blueprints—The Ozalid Products Division of the General Aniline & Film Corporation, has put out a new booklet entitled "Simplified Print Making" going into considerable detail of the operation and mechanical make-up of the company's print-making machinery. The 24-page booklet, handsomely illustrated, with both photographs and diagrams, gives exact specifications of the various machines and their uses and limitations. —*Ozalid Products Division, General Aniline & Film Corporation, Johnson City, N. Y.*

Highways and Runways—A new book on the design and construction of bases for highways and airport runway pavements is announced by the Solvay Sales Corporation. This book contains new information recently developed on design and construction of bases. It condenses information from recent reports and also includes new information on methods which will both insure proper density and at the same time effect substantial savings in water and compactive effort.—*Solvay Sales Corporation, 40 Rector St., New York, N. Y.*

Circuit Control Switches—A new 4-page bulletin illustrating and describing improved G. E. circuit control switches for industrial applications has been announced. Switches shown in the bulletin are for use in signalling equipment, communication apparatus, instrument panel boards, utility lighting systems, specialized lighting equipment, aircraft circuit control systems, etc. The publication shows 26 toggle and push button switches.



THIS DREDGE PIPE
lasts longer...
speeds the job

Stepped-up ship building and operating schedules call for fast work on war-time dredging contracts. You can help meet this demand for speed by using ARMCO *Spiral Welded* Shore and Pontoon Pipe. Here is why:

This special dredge pipe carries more yardage because it lasts longer and requires fewer time-outs for repairs and replacements. It speeds the job too. ARMCO Spiral Welded Shore Pipe has accurate, machine-contracted joints that are easily assembled and practically leak-proof. No bothersome shingling is required. A line may be "broken out" and reassembled in short order. All ARMCO Spiral Welded Dredge Pipe is smooth inside —free from laps, weld globules and other obstructions. A steady flow is assured and pressures remain normal.

ARMCO Spiral Welded Shore and Pontoon Pipe is available for vital war-time dredging operations. Order it in any length that can be shipped and handled, and in diameters from 6" to 36". Special elbows and bends are mill-fabricated to your specification. Also important now, the standard dimensions and tolerances of this wear-resisting pipe enable it to fit perfectly into any type of existing installation. Your war-time replacement problem is greatly simplified. Write or wire for prices and delivery information. The American Rolling Mill Company, Pipe Sales Division, 2571 Curtis Street, Middletown, Ohio.

ARMCO

ARMCO

SPIRAL WELDED DREDGE PIPE

The Finest

THAT SKILL AND
EXPERIENCE CAN BUILD

To our Railroads, America pays thankful tribute! They are doing a magnificent job in speeding troop and war material movement. Since pioneer days, our railroads have led the world in quality, efficiency and capacity. They are the finest that skill and experience can build.

But for these railroads—the shops that build locomotives, cars, rails and equipment, there had to be an abundance of water. With amazingly few exceptions, it was Layne who designed and built their Well Water Systems. Layne Wells and Pumps are famed for their high efficiency, long life and low upkeep cost.

Layne Well Water Systems, like our great American railroads are doing a magnificent job. They are standing up to unmerciful treatment—day after day and month after month of continuous full capacity operation. It is in this tragic period of emergency that Layne reliability, skillful design and rugged construction is most appreciated. Thousands of Layne Well Water Systems are serving railroads, factories, municipalities, irrigation projects and both the Army and Navy. For late catalogs, bulletins, folders, etc., address,

LAYNE & BOWLER, INC.
Memphis, Tenn.

LAYNE
PUMPS & WELL
WATER SYSTEMS

Affiliated Companies

Layne-Arkansas Company	Stuttgart, Ark.
Layne-Atlantic Company	Norfolk, Va.
Layne-Bowler New England Corp.	Boston, Mass.
Layne-Central Company	Memphis, Tenn.
Layne-Northern Company	Mishawaka, Ind.
Layne-Louisiana Company	Lake Charles, La.
Louisiana Well Company	Monroe, La.
Layne-New York Company	New York City
Layne-Northwest Company	Milwaukee, Wis.
Layne-Ohio Company	Columbus, Ohio
Layne-Texas Company	Houston, Texas.
Layne-Western Company	Kansas City, Mo.
Layne-Western Co. of Minn.	Minneapolis, Minn.
International Water Supply, Ltd.	London, Ont.

WORLD'S LARGEST WATER DEVELOPERS

—*General Electric Co., 570 Lexington Ave., New York, N. Y.*

Attachments—The Austin-Western Co. has issued a new leaflet AD-1995, covering the bulldozing attachment and roller attachment for the Austin-Western "99-M" power grader.—*The Austin-Western Road Machinery Co., Aurora, Ill.*

Rubber Conservation—The B. F. Goodrich Co. has just published a catalog section on belt vulcanizers, said to be one of the most important adjuncts to rubber belt conservation. The catalog section gives all pertinent details on the type of construction of its vulcanizers, dimensions, capacities, and the type of current necessary to operate them. A full page is devoted to a table giving all this information in condensed form.—*The B. F. Goodrich Co., Akron, Ohio.*

Protection—A newly published brochure "Blackout, Air Raid Damage and Glass Splinter Protection," has been offered by the Clinton Carpet Co. and is said to prevent for the first time a comprehensive and authoritative analysis of this vital war-time problem combined with practical means for its solution, through the use of Ozite air raid safety blanket and Ozite blackout blanket.—*Clinton Carpet Co., Merchandise Mart, Chicago, Ill.*

War Production—Highlighting General Motors' role of production in the war effort, a new bulletin "Producing more for Victory," has been issued by the company. Prepared for distribution to the more than 245,000 employees, the booklet is a summary of the company's activities.—*General Motors Corporation, Broadway at 57th St., New York, N. Y.*

Soil Stabilization—The Kotal Company of New York has issued a new bulletin, No. 9, in a series dealing with various applications to bituminous road and runway construction. This new bulletin describes the operating methods for stabilizing soils with asphalt cutback and Kotal, which it is claimed, permits the use of soils running very high in moisture content and eliminates the need for accurate moisture control.—*Kotal Co., 52 Vanderbilt Ave., New York, N. Y.*

Pine—A nation-wide survey to determine proper methods of woodwork care has recently been completed by Ponderosa Pine Woodwork. The results of this survey have been embodied in an easy-to-read folder. The folder "Pointers on Care of Woodwork" was compiled from scores of letters received from leading woodwork manufacturers, dealers and contractors throughout the country. It is presented as an unbiased, thoroughly authentic guide to better care of wood-

EXPANSION JOINTS
MADE EASY
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This new improved Union Dowel and Joint Assembly Unit assures lower cost, simplified installation, and fool-proof, trouble-free functioning. Dowels are accurately positioned and locked parallel to each other and to the subgrade.

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work.—*Ponderosa Pine Woodwork, 111 W. Washington St., Chicago, Ill.*

Facts—A timely message for "cletrac" dealers is included in a new bulletin issued by the Cleveland Tractor Company. The bulletin, a regular issue of "Cletrac Facts" explains in detail the requirements of the war effort on manufacturers and the availability of repair and replacement parts. It also shows the company's participation in the war effort.—*The Cleveland Tractor Co., Cleveland, Ohio.*

Tools—The McKenna Metal Co. has just issued a new catalog, 42 V, covering specifications and prices of Kennametal steel-cutting carbide tools and blanks. Complete in every detail, the new catalog contains both line drawings and large halftone illustrations of each standard type Kennametal tool. In addition, typical applications of each style of tool are illustrated by line drawings. —*The McKenna Metals Co., 128 Lloyd Ave., Latrobe, Pa.*

War Work—To bring home to LeTourneau workers the vital part its plants and men are playing in the war effort, even though they may not be directly concerned with production of guns or shells or other war materials, the company has issued a new booklet called "LeTourneau Works for Victory."—*R. G. LeTourneau, Inc., Peoria, Ill.*

Instruments—A new bulletin, No. Z-6000, has been issued by the Wheelco Instruments Co. to its customers and dealers. Due to critical metal shortages, it has now become necessary to discontinue entirely all aluminum cases on measuring and controlling instruments. However, the company is offering "Universal" Capacitrol, Limitrols, Potentiotrols, and other Controllers in steel cases, at prices quoted in the bulletin. All other Wheelco instruments have now been made available in steel or cast iron cases.—*Wheelco Instruments Co., Harrison and Peoria Sts., Chicago, Ill.*

Thermometers—The Bristol Co. of Waterbury, Conn., has published a new bulletin, No. T302, on its line of fully-compensated liquid-filled recording thermometers for temperatures between −125 deg. F., and +400 deg. F. The bulletin gives detailed information concerning construction of the instrument, and also information concerning its the various forms in which it is furnished, application.—*The Bristol Co., Waterbury, Conn.*

Covers—The Wiremold Company has announced publication of a new catalog, FL-5, and price list covering Wiremold "V" type cover fluorescent units and

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HEAT INSULATIONS

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in largest POWDER PLANT

In one of the nation's mammoth powder plants, CAREY Heat Insulations are rendering vital service—aiding in the efficient and economical production of explosives for our armed services.

The insulation requirements for this project included many miles of pipe covering for outside lines ranging in size from ½″ to 30″ in diameter, and additional miles of insulation for inside lines. Apart from the piping, numerous other pieces of processing equipment—stills, vapor columns, condensers, concentrators, etc.—required adequate insulation.

In hundreds of plants throughout the nation, CAREY Insulations are helping industry win the battle of production. Their high efficiency; their ability to withstand extreme temperatures and pressures; their toughness and durability; their variety, covering all service conditions; are qualities known to leading engineers the country over. For details, address Dept. 30.

Whatever your insulation requirements, you're SAFE *with* CAREY. *A nation-wide organization is at your service.*

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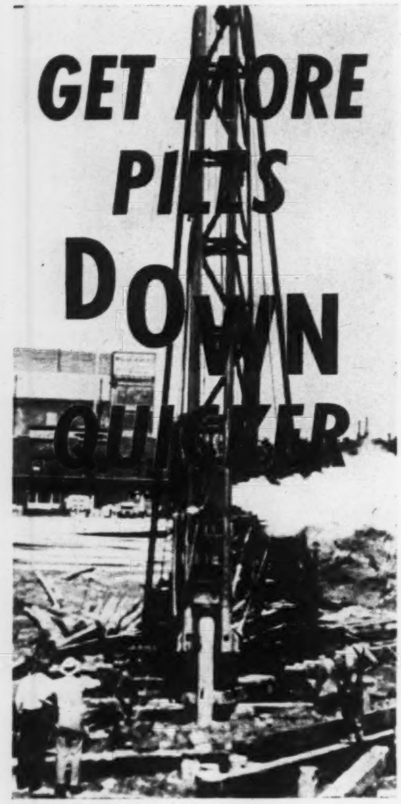

VULCAN
PILE HAMMERS

● In rush construction such as for docks, industrial buildings, bomber plants, power plants, bridges — get that important initial speed with VULCAN Pile Hammers.

Twice the blows per minute —more penetration of each pile per blow — that is VULCAN's contribution to our war-winning effort. Plus that of definite cost savings.

Simple design, positive action, easy to operate, the Super - VULCAN Open-Type Pile Hammer fits the same leads and uses the same accessories as the Warrington-VULCAN Single-Acting Pile Hammer which delivers a moderate frequency of low velocity blows from a relatively heavy ram. Write for fully descriptive bulletins on our complete line.

We also make Super - VULCAN Differential-Acting Closed - Type Steam Pile Hammers and VULCAN Pile Extractors.

Open Type
Sizes 18c,
30c,50c, 80c

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Since 1852
331 North Bell Avenue
Chicago Illinois

Line-O-Lamps adaptable to a wide range of fluorescent lighting applications in industrial plant buildings, factory offices, engineering departments, inspection departments and the like. This equipment, being a further development of the Wiremold "3000" system for wiring and lighting, offers exceptional flexibility in installation.—*The Wiremold Co., Hartford, Conn.*

Zinc—A new folder, designed to inform customers of the war-time status of zinc, has been issued by the New Jersey Zinc Company. The folder is the third in a series.—*The New Jersey Zinc Co., 160 Front St., New York, N.Y.*

Traveling Cranes—A 16-page catalog describing the product and unit parts such as trolleys, end trucks, gears and cabs, has been issued by the Reading Chain & Block Corporation. Cranes and parts described are of the types having the widest applications, with on-the-job photographs that show specific installations.—*Reading Chain & Block Corp., Reading, Pa.*

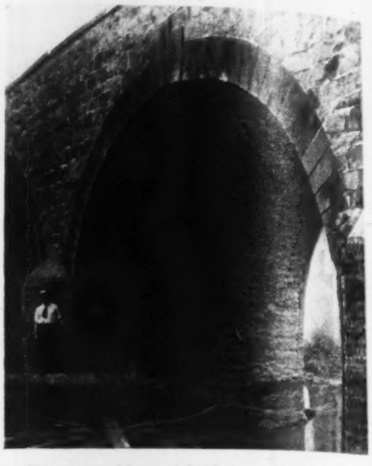
Salvage—How an industrial concern enabled its home community to establish what is believed to be a record for the collection of war-use salvage is disclosed in a brochure issued by the Lukens Steel Company. The company planned, launched and lead a Coatesville, Pa., salvage-collection drive that yielded scrap to the total of 616,065 pounds.—*The Lukens Steel Co., Coatesville, Pa.*

Diesel Engines—An extremely valuable addition to war time maintenance information is Service Bulletin No. 19 on diesel engines and their lubrication, issued by the Kendall Refining Co. Well illustrated with diagrams showing the various types of diesel engines now in use, the book contains invaluable information on proper fuels and lubricating practices.—*The Kendall Refining Co., Bradford, Pa.*

Welding Chart—An arc welding inspection chart, which will provide welding inspectors and others concerned with weld production a simple and extremely helpful aid for use in inspecting welds, has been published by the Lincoln Electric Co. The chart presents graphically the different types of welds obtained when the work is done normally, with normal current, voltage and speed, as compared with those obtained when these factors are abnormal.—*The Lincoln Electric Co., Cleveland, Ohio.*

Rubber Linings—A new catalog section on its Vulcalock Rubber Linings for handling corrosives and abrasives has

BRIDGE REPAIRS



This very old stone bridge was in bad shape when reinforced "GUNITE" was called into service to prolong its active life indefinitely. Whether stone, concrete or steel, and regardless of its condition, any bridge can be restored at small cost as compared with building anew. Write us for details!

The "CEMENT GUN" can be bought by anyone, and used without restrictions.

CEMENT GUN COMPANY
Manufacturers of the "CEMENT GUN"
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HANG ON

BECAUSE they have a special grip, Electroline-Fiege Wire Rope Connectors "hang on" under all conditions. The bite is tapered from rear to front. That dampens vibrations, thus preventing crystallization and fraying, gives you a positive connection and added rope life.

Electroline-Fiege connectors are safe (no molten metals to injure workmen or weaken wire rope,) streamlined, easy to install and economical. There are styles and sizes to fit every need. Write today for the interesting booklet, "Positive Grip". It is full of useful data.

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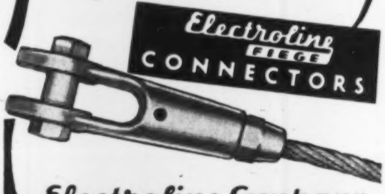


Electroline Company
4121 South La Salle Street
Chicago, Illinois

been published by the B. F. Goodrich Co. The catalog section points out that satisfactory rubber linings have been developed for handling most inorganic acids, except strong oxidizing agents such as nitric, chcronic and concentrated sulphuric, as well as for most inorganic salts and alkalies, and many organic chemicals now in commerce.—*B. F. Goodrich Co., Akron, Ohio.*

Substitutes—The necessity of avoiding employment of strategic materials has created many problems for users of water service pipe and fittings, and some of these problems are solved in a new bulletin issued by the American Smelting & Refiining Co. The catalog pays particular attention to Asarco type K Tube-Loy and Grinnell Superseal Flared Tube-Loy Fittings. — *The American Smelting & Refining Co., Road Products Div., 120 Broadway, New York, N. Y.*

War—"Caterpillar" Diesels go to War! is the title of a new black and white booklet just issued by the Caterpillar Tractor Co. Both combat and noncombat use of Caterpillar products are described and pictured. — *Caterpillar Tractor Co., Peoria, Ill.*

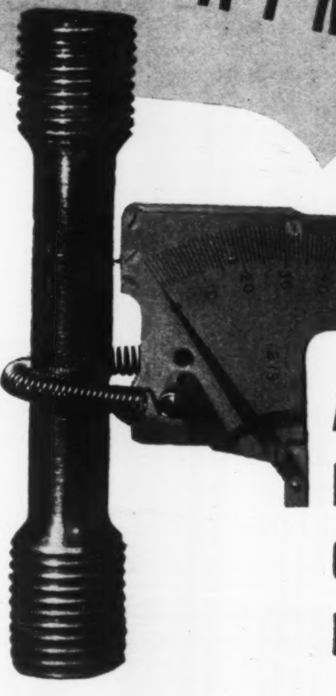
Blowers—Rotary positive blowers are covered by Bulletin 22:23-B-11 just issued by the Roots-Connersville Blower Corp. Profusely illustrated, this bulletin shows numerous installation views, details of construction, etc.—*Roots-Connersville Blower Corp., Connersville, Ind.*

Pump Data Sheets—As a special wartime service to pump operators, Goulds Pumps, Inc., has made available the company's "Pump Application Sheets," originally prepared for the confidential use of its own salesmen. These sheets, of two to eight pages each, include both elementary and advanced technical data on selection, installation, operation and maintenance of all types of industrial pumps for general and specialized services. The sheets are furnished in a durable file folder containing an extra pocket for the recipient's own notes and hydraulic data.—*Goulds Pumps, Inc., Seneca Falls, N. Y.*

Meters—A description of the new Centrimax flowmeter, a high accuracy equipment for measuring and integrating flow of water, steam and other fluids, has been issued by Leeds & Northrup Co. The 20-page catalog shows installations and many of the uses of these instruments.—*Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.*

Torches—To aid the victory program by providing distributors, dealers and owners with information that will enable the users of blow torches to get maxi-

PORTER-LIPP STRAIN GAGE



Accurate
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Prompt Delivery

Rapid development of the volume and technique of structural testing in the United States during the past decade has given rise to the need for an all purpose strain gage. A mechanical type of gage that is accurate, yet inexpensive, light, compact, rugged and convenient is desirable in order to give consistent results in both the laboratory and the field.

The pressing demand for a satisfactory strain gage in the present time of emergency, during which European sources of instruments have been cut off, finds the Porter-Lipp strain gage filling a definite need for a superior instrument of this type.

The strain multiplication factor of this gage is approximately 300 and it has a range of 0.008 in. or better. Weighing only 0.4 oz. the Porter-Lipp has overall dimensions of 1¾ in. by 2 in. by ⅜ in. It is graduated so that each division corresponds to a strain of approximately 0.0001 in. and has a readable accuracy of 0.00002 in. for a gage length of one inch.

Write for our new bulletin No. 166

Baldwin Southwark

DIVISION OF THE BALDWIN LOCOMOTIVE WORKS
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CONTROLLED SPEED OF OPERATION

Modern wartime parachutists control speed of descent and directional drift by shroud-line manipulation. Owen bucket closing speed is inversely proportionate to closing power and adjustable reeving makes possible maximum closing speed or maximum closing power whenever either are required by digging or rehandling conditions.

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All kinds of Structural Timbers and Lumber Pressure Treated with Creosote Oil or

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• By using Diamond Core Drills we prospect Coal and Mineral Lands. We are fully equipped for testing foundations for bridges, dams, buildings, and all work of a similar character.

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Drilling Contractors
PITTSBURGH - - - - PA.

mum efficiency and service, the Turner Brass Works has printed an entire issue of its publication, Turner Topics, devoted to the care of such torches.—*The Turner Brass Works, Sycamore, Ill.*

Excavating—"Let's Dig In and Win" is the title of a new bulletin featuring the use of Traxcavators for a variety of excavating jobs. Interesting action pictures show these heavy duty tractors excavating and loading machines digging and moving dirt for the construction of airports, defense plants, oil pipe lines, defense housing and highways. Included also are mechanical views and specifications of three models and other action views showing Traxcavators digging in toughest soils.—*Trackson Co., Milwaukee, Wis.*

Rubber—An attractive booklet describing the highlights of its 25-minute motion picture "Keep 'Em Rolling," showing the importance of rubber in the nation's war effort has just been published by the B. F. Goodrich Co.—*B. F. Goodrich Co., Akron, Ohio.*

Carriers—A new bulletin showing the various applications and types of drum carriers manufactured by the company has been issued for its customers and dealers.—*The Ernst Carrier Sales Co., 1456 Jefferson Ave., Buffalo, N. Y.*

Vibrating Screens—The Robins vibrating screen—a high speed vibrator—designed throughout to give the highest possible capacity and efficiency through correct application of fundamental screening theory, is described in a new publication put out by the manufacturer. The bulletin describes details of construction and operation of the screens as well as showing some of them in action on jobs.—*The Robins Conveying Belt Co., Passaic, N. J.*

Pumps—The proper application of centrifugal pumps presupposes an understanding of their limitations and potentialities, and knowledge of how pump characteristics are affected by features of design should, therefore, be of interest to pump users. An elementary analysis of centrifugal pump performance is presented in an article by H. Gartmann, which has been reprinted and is being distributed by the De Laval Steam Turbine Co. The influence of blade angles and of the areas of wheel passages upon the head capacity curve is explained by means of simple diagrams, and it is shown how, once the characteristic curves of a given pump at a certain speed are known, it is possible to predict delivery, head and power requirements and efficiency at other speeds.—*The De Laval Steam Turbine Co., Trenton, N. J.*

How User of Dredge Cutterhead Blades *Conserves Manganese Steel*

As we all know, manganese is a metal indispensable to our war machine. It is used in the production of virtually every ton of steel made, not merely as a constituent of a high alloy steel like 13% manganese steel, but also as a "scavenger" in tonnage steels to remove weakening elements like sulfur and oxygen. While a relatively small amount of manganese is required per ton of rolled steel, the total necessary in the annual production of 85,000,000 tons of steel is impressive, particularly when we remember that the foreign sources from which high grade manganese ore is obtained are no longer fully available.

To assure maximum service, so necessary at this time, from equipment parts subjected to shock and abrasion, the use of manganese steel is essential; but, as in the cases of other vitally essential metals, we must be saving in the use of "new" manganese and in the reuse of metals containing it. Likewise, if it is possible to reclaim 13% manganese steel parts without remelting them, then by all means it should be done, even if there is no immediate "dollar" saving.

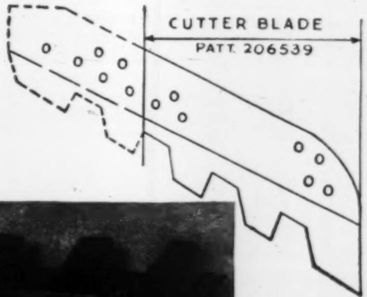
We've advocated for many years the reclamation of worn manganese steel castings by build-up welding, where the worn away weight is small in relation to the total weight of the piece. Now we can give an instance of another kind of reclamation where more than half the weight of a new casting was saved by a little ingenuity.

New "Toe Ends" Riveted On

A dredging company had found that in using on their suction dredge cutter heads the type of blade shown in picture (A-242), the wear on the "toe end" of the blade was so much faster than on the heel end that the latter remained almost intact when the toe end was badly worn. They had us cut the pattern in two and make a number of separate toe ends, which could be riveted to the cutter head very nicely when a suitable joint with the heel piece had been cut with the torch. Our outline sketch tells the story: the part in solid line is the portion we made for them to "wear out" the good section still available for service.

It is sensible to use Amsco Manganese Steel where ordinary steel parts would wear rapidly—but use it judiciously and reclaim wherever possible.

This is no time to cling to individual advantages—we recognize that, and are willing and anxious to do our part—*To Win This War!*



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AMERICAN MANGANESE STEEL DIVISION
OF THE AMERICAN BRAKE SHOE & FOUNDRY CO.
Chicago Heights, Illinois

Manganese Steel Castings for shocks and abrasion.
Chromium-Nickel Alloy Castings for heat and corrosion resistance.
Power Shovel Dippers. Dredge and Industrial Pumps.
Welding Materials for reclamation and hard-surfacing

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★ ★ ★ ★ CHICAGO PNEUMATIC NEWS ★ ★ ★ ★

CP VIBRATORS ON 32 BIG DAM PROJECTS

↑ **KNOCKING DOWN A BATCH** at Cottage Grove Dam with CP Model 417 one-man type Pneumatic Vibrators. Note harsh, stiff mix, with 6-inch cobbles — convincing proof of the power and ruggedness of CP Concrete Vibrators, Pneumatic and Hicycle Electric.

USED AT GRAND COULEE, SHASTA, FRIANT AND MANY OTHER DAMS

Figure in Many Concreting Records

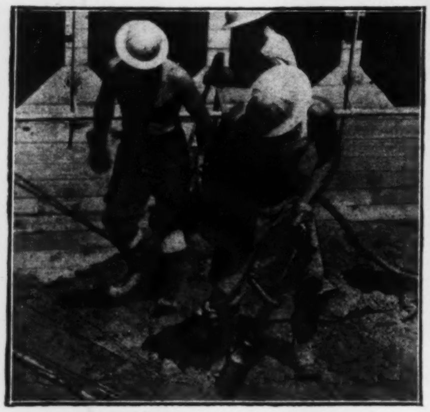
NEW YORK (CP) — At Grand Coulee, Shasta, Friant, Caddoa, Dennison, Ruby, Cottage Grove, Marshall Ford — on practically every large dam project started within the last four years — CP Concrete Vibrators, Electric and Pneumatic, have made outstanding records for performance and low maintenance costs.

On 32 dams, the total maintenance cost of CP Vibrators — parts and labor — averaged approximately 1¢ per cubic yard. On many of these 32 dams, CP Vibrators were used exclusively for both mass and reinforced concrete. Write for complete data.

CHICAGO PNEUMATIC
TOOL COMPANY

General Offices: 8 E. 44th St., New York, N. Y.

SANTA FE DAM... CP 325 → Pneumatic Vibrators. Note coarse aggregate on top of mix — and smooth appearance of the vibrated section.



← **FIRST BUCKET** of concrete at Shasta Dam, July 8, 1940. The vibrators are CP 417, Pneumatic, ideal for batches up to 2 cubic yards.

THERE ARE 7 MODELS of CP Concrete Vibrators, Pneumatic and Electric, for mass and reinforced concrete; one-man, two-man types — powerful, low in maintenance. ↓

CHICAGO
PNEUMATIC

CONTRACTORS' EQUIPMENT

Air Compressors, Rock Drills, Pneumatic Tools, Vibrators, Pumps, Electric Tools, Diesel Engines

CONSTRUCTION REPORTS

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York
ELSIE EAVES, Manager *SCOTT McLEOD, Statistician*
(Daily service also available—Write for details)

Location of ENR Correspondents

Symbols and Abbreviations Include

†	Federal Government
★	Project of $500,000 or over
ENR	Engineering News-Record
CD	Engineering News-Record Construction Daily
A-E-M	Architect — Engineer-Management type of contract.

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Named in order of Listing)

Water Supply
Sewers, Waste Disposal
Bridges, Grade Cross'gs
Streets & Roads
Earthwork, Waterways
Unclassified
Latin America
Public Buildings
Commercial Buildings
Industrial Buildings

Stages Reported

PROPOSED: (except Streets & Roads):

BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR);

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

Note: To comply with censorship requirements, addresses on some reports are being generalized. Data which would reveal the purpose of the improvements and the size are withheld. The name of contractor and general area are reported.

WATER SUPPLY

PROPOSED WORK

†California—U. S. Eng., 751 S. Figueroa St., Los Angeles, plans by A. H. Koebig, archt. and engr., Rowan Bldg., Los Angeles, Calif., water, electric and sewage systems, Inyo Co.

Calif., Pittsburg—F. R. Taormina, city clk., rejected bids July 6, exten water sys. CD 7/10—ENR 7/16 under LB.

†Georgia—U. S. Eng., Post Office Bldg., Savannah, WW, Chatham Co.

★**†Me., Portland**—Portland Water Dist., F. J. Reny, mgr., Casco St., soon takes bids submarine watermain, incl. 37,840 ft. 12 in. cement asbestos or c.i. mains. Me 17-134. $985,000 FWA. Metcalf & Eddy, 1300 Statler Bldg., Boston, Mass., engrs. CD 7/14—ENR 7/16.

Tex., College Station—E. Langford, mayor, WW and sewerage systems. $43,650. Applied to FWA. J. T. L. McNew, College Station, engr.

Tex., Dallas—City, water distributing lines. $75,000.

†Washington—U. S. Eng., 800 3 Ave., Seattle, plans by M. O. Sylliassen, Dexter Horton Bldg., Bebb & Jones, Hoge Bldg., and L. Bouillon, 1411-4 Ave. Bldg., Seattle, storage reservoir, Snohomish Co.

Alta., Wetaskiwin—Calgary Power Co., Ltd., Calgary, water supply exten., well drilling. $25,000.

B. C., Victoria (Maple Ridge)—Maple Ridge Municipality bids soon water sys. for Haney area. $38,000.

N. B., St. John—Watermain connections. $16,000. D. R. Smith, City Hall, engr.

North West Territory, Yellowknife—Consolidated Mining & Smelting Co. of Canada, Ltd., Trail, B. C., water storage dam on MacRae River. $40,000.

Ont., Aurora—A. C. Willis, municipality clk., supplementing water supply sys. $30,000. **James, Redfern & Proctor, Excelsior Bldg., Toronto, engrs.**

Ont., Hamilton—Municipality, water and sewer facilities. $35,000. W. L. Mac Faul, City Hall, engr.

Ont., Port Arthur—Watermains, 4 streets, $18,000. S. E. Flook, City Hall, engr.

Ont., Welland—Municipality, water and sewer services. $30,000. J. C. Street, Town Hall, engr .

Que., Yamachicke—Municipality c/o C. E. Girardin, mayor, well construction, 2 dams. $40,000. Dpt. Pub. Wks., Quebec City, engrs.

BIDS ASKED

Bids Asked August 17

Ill., Chicago—O. E. Hewitt, comr., Dpt. Pub. Wks., City Hall, 11,460 ft. 24 in. Class B c.i., steel shell encased in concrete, rein.-con. or asbestos-cement water pipe.

Md., Towson—Comrs. Baltimore Co., Courthouse, 13,195 lin. ft. 6-10 in. c.i. watermains Gray Manor; 4860 lin. ft. 6 and 8 in. c.i. water mains, Edgewater addn., Middle River. G. W. Stevens, Jr., Courthouse, engr.

Bids Asked August 20

†Ohio—Federal Works Agency, Office of Regional Engineers, 1506 20 N. Wacker Dr., Chicago, Ill., 22 m.g. reservoir on north side of Miami Erie Canal, part of Ohio 33-234. Alvord, Burdick & Howson, Engineers, 20 N. Wacker Dr., Chicago, Ill., engrs.; adv. ENR 8/13.

Bids Asked September 8

S. D., Sioux Falls—J. S. Nelson, water comr., two 40 ft. 3 mgpd wells.

Bids Asked

†New Mexico—U. S. Eng., Albuquerque, water distr. sys. est. $15,000. Plans $25 deposit.

†Texas—U. S. Eng., 231 W. Main St., Denison, steel and concrete water storage facilities, ground and overhead. Over $15,000. Plans $50 deposit; also WW pump, plant, over $15,000. Plans $50 deposit.

Tex., Ballinger—E. W. Staph, engr., 520 Alamo Bldg., San Antonio, installing 4½ mi. 8 in. steel water pipeline, installing pumps, pump. sta., tanks, for owner. Over $25,000.

†Pacific Northwest — U. S. Eng., Textile Tower, Seattle, Wash., auxiliary water supply sys. CD 7/30—ENR 8/6.

LOW BIDDERS

Md., Towson—Comrs. Baltimore Co., Court House, item 1, Contr. 60W, installing 3,260 lin. ft. 6 in c.i. watermains, vicinity Marlyn Ave., Essex, from Eastern Constr. Co., 224 S. Albemarke St., Baltimore. CD 7/21—ENR 7/23.

†Okla., Tulsa—At office City Auditor, City Hall, July 28, Contr. 1, WW. Okla., 34-101, from Worthington Pump & Machinery Corp., 424 N. Boulder St. **$65,657.** FWA. CD 7/9—ENR 7/16.

CONTRACTS AWARDED

★**†Alabama**—U. S. Eng., U. S. Courthouse & Customhouse, Mobile, water treatment plant addns., pump station, sewage treatment plant, etc. Macon Co., to McKissack & McKissack, Memorial Bldg., Nashville, Tenn. **$500,000-$1,000,000.**

†Arizona—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., drilling water well, to Roscoe Moss Co., 4360 Worth St., Los Angeles, Calif., under **$50,000.**

†Arizona—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., drilling water well, Maricopa Co., to Roscoe Moss Co., 4360 Worth St., Los Angeles, Calif., under **$50,000.**

★**†Arkansas**—U. S. Eng., Post Office & Courthouse, Vicksburg, water and sewer systems, Drew Co. to L. O. Brayton & Co., Dyersburg, Tenn. **$500,000-$100,000,000.**

†California—U. S. Eng., 1209 8 St., Sacramento, drilling, casing, tenting, and proving water wells, Sacramento Co., to L. W. Kirchgater, 3992 14 Ave., Sacramento, under **$50,000.**

†California—U. S. Eng., 751 S. Figueroa St., Los Angeles, drilling water well, San Bernardino Co., to E. W. Brockman, Corona. Under **$50,000.**

Calif., Fontana—Kaiser Co., Latham Sq. Bldg., Oakland, water treatment plant at steel mill, 2 and 3 story filter house, pump house, head house, 1,200,000 gal. industrial reservoir, 500,000 gal domestic reservoir, all rein.-con., pipe lines, etc., to MacIsaac & Menke, 3440 E. 22 St., Los Angeles. Over **$15,000.** J. M. Montgomery & Co., 306 W. 3 St., Los Angeles, engrs.

†Florida—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, water supply sys. and sewage treatment plant, Dade Co., to The Murphy Constr. Co., Clare Ave., West Palm Beach, **$50,000-$100,000.**

†Florida—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, expanding water distr. sys. and sewage collection sys., Bradford Co., to Langston Constr. Co., Orlando. Under **$50,000.**

†Georgia—U. S. Eng., Post Office Bldg., Savannah, water distr. and sanitary sewerage systems and disposal plant, Mc Intosh Co., to J. B. McCrary Co., Inc., 22 Marietta St. Bl., Atlanta, under **$50,000.**

†Georgia—U. S. Eng., U. S. Post Office Bldg., Savannah, constructing drinking water, fire protection and sanitary sewerage systems, Chatham Co., to Espy Paving & Construction Co., 108 E. Bay St., Savannah, **$50,000-$100,000.**

†Georgia—U. S. Eng., Post Office Bldg., Savannah, WW imprvs. Ware Co. to C. M. Guest & Sons, Anderson, S. C.

†Illinois—U. S. Eng., 800 U. S. Court House & Custom House, St. Louis, Mo., rein.-con. water storage reservoir, to Preload Co., 80 W. Dedham St., Boston, Mass.

†Kentucky—U. S. Eng., U. S. Post Office and Courthouse, Cincinnati, O., water filtration plant, fire storage reservoir, pump house, Madison Co., to Penker Associates, Inc., 1020 Summer St., Cincinnati, O., **$100,000-$500,000.**

Miss., Ocean Springs—WW sys., to B. L. Knost, Pass Christian, **$23,705.** Bids 7/20. CD 7/15.

†Nebraska—U. S. Eng., 1709 Jackson St., Omaha, water and sewer lines to National Constr. Co., and Central Plumbing Co., 1335 S. 20 St., Omaha, under **$50,000.**

†New Mexico—U. S. Eng., Albuquerque, water, gas and sewerage systems, grading, roads, drainage, Santa Fe Co., to Denison & Shotwell, Albuquerque. **$100,000-$500,000.**

†New Mexico—U. S. Eng., Albuquerque, water, electric and sewerage systems, San Miguel Co., to M. M. Sundt Constr. Co., Tucson, Ariz., **$50,000-$100,000.**

†Oklahoma—U. S. Eng., 416 Wright Bldg., Tulsa, water distr. supply sys., Mayes Co., to Lester Douglas Contractor, Inc., Springfield, Mo. Under **$50,000.**

†Oklahoma—U. S. Eng., 231 Main St., Denison, Tex., water storage and pumping plant, sewage treatment plant, Jackson Co., to Lippert Bros., Oklahoma City. **$100,000-$500,000.**

†Oklahoma—U. S. Eng., 231 W. Main St., Denison, Tex., water storage and pump plant, sewage lift pump station, Tillman Co., to Lippert Bros., Oklahoma City. **$50,000-$100,000.**

†Pennsylvania—U. S. Eng., Standard Oil Bldg., Baltimore, Md., furnishing, erecting elevated steel water storage tank, Franklin Co., to Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, under **$50,000.**

†Pennsylvania—U. S. Eng., Chimes Bldg., Syracuse, N. Y., water storage tanks, Lycoming Co., to Chattanooga Boiler & Tank Co., 1011 E. Main St., Chattanooga. Under **$50,000.**

†South Carolina—U. S. Eng., 33 Customhouse, Charleston, drilling wells, Scotland Co., to Carolina Drilling & Equipment Co., Sanford, N. C. Under **$50,000.**

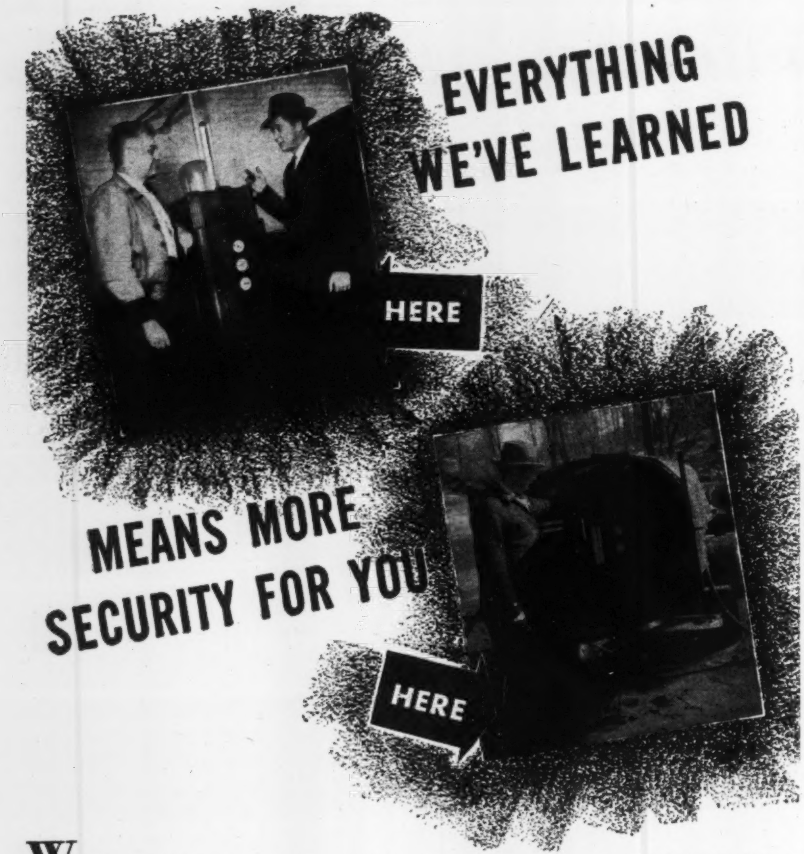
†Texas—U. S. Eng., 231 W. Main St., Denison, well, Cooke Co., to Layne-Texas Co., Ltd., 3901 Elm St., Dallas, under **$50,000.**

†Texas—U. S. Eng., San Antonio, water and sewage sys., to Hays and Donathan, 6902 Main St., Houston. Under **$50,000.**

†Texas—U. S. Eng., San Antonio, water and sewer sys., Brown Co., to J. E. Dickey, San Antonio, Tex. Under **$50,000.**

†Texas—U. S. Eng., 231 W. Main St., Denison, water storage and pumping plant, sewage plant, Childress Co., to Lippert Bros., Oklahoma City. **$100,000-$500,000.**

★**†Texas**—U. S. Engineers 25 St. and Avenue F, Galveston, water, sewer and gas sys., streets, grading, drainage, Victoria Co. to Thomas Bate & Sons, 1127 Girard St., Houston, **$500,000-$1,000,000.**



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WATER SUPPLY (Contracts Awarded, Cont'd)

†Tex., Amarillo—Federal Works Agency, Electric Bldg., Fort Worth, improv. and extend. WW, Tex. 41-498 F to Williams & Whittle, Inc. and Williams & Broughton, 5422 Mockingbird Lane, Dallas. **$350,696.**

Tex., Borger—Hycar Chemical Co., Bartlesville, Okla., water distr. lines and facilities. Force account. $22,000. Bids about June 15.

†Virginia—U. S. Eng., U. S. Post Office Bldg., Savannah, drilling water wells, Ware Co., to Layne-Atlantic Co., Cromwell Rd. and Flanders Ave., Norfolk, under **$50,000.**

†Washington—U. S. Eng., 800 3 Ave., Seattle, water sys., King Co., to Sheet Metal Works and J. R. Dunden, Oak Harbor. **$100,000-$500,000.**

Que., Pointe Claire — Municipality c/o R. Labrosse, clk., pump plant, intake pipe, to Lakeshore Constr. Co., Ltd., 137 Cartier St., **$53,695.** Est. $75,000. OX CD 6/16—ENR 6/18.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

La., New Orleans—A. G. Moffat, secy. Water Bd., plans sewerage sys. exten. $410,792. Applied to FWA. A. B. Wood, 526 Carondelet St., engr.

†Md., Baltimore—Federal Works Agency, State Planters Bank Bldg., Richmond, Va., addlt. sewerage system. $444,000.

†New Jersey—U. S. Eng., 6 and Walnut Sts., Phila., Pa., plans by M. Pirnie, 25 W. 43 St., New York, N. Y., addns. to sewage disposal plant and sewer distr. sys., Burlington Co.

†Ohio—U. S. Eng., Wright Field, Dayton, plans by Greeley & Hansen, 6 N. Michigan St., Chicago, Ill., sewerage sys., Greene Co. Under $50,000.

Tex., Dallas — City, sanitary sewer lines. $325,000.

Tex., Hondo—F. X. Vance, city secy., sanitary sewerage sys. $111,693. Applied to FWA. J. Montgomery, Littlefield Bldg., Austin, engr.

Que., Longueuil—Town Clerk, bids soon incinerator plant. $50,000. A Plamondon, 369 Mount Royal Ave. W., Montreal, engr.

BIDS ASKED

Bids Asked August 18

Que., Montreal—Executive Com., City Hall, sewer. Hydro-Electric Operating Bur., City Hall, engrs.

Bids Asked August 19

†N. H., Portsmouth—City, Street Comrs., City Hall, outlet sewer, NH 27-108. $25,000. FWA. F. A. Barbour, 1119 Tremont Bldg., 73 Tremont St., Boston, Mass., engr. CD 4/14—ENR 4/16.

†New Mexico—U. S. Eng., Albuquerque, sewage collecting **sys. Est. $25,000.** Plans **$25 deposit.**

†Texas—U. S. Eng., 231 W. Main St., Denison, sewage disposal plant. Plans $50 deposit.

†Texas—U. S. Eng., 231 W. Main St., Denison, sewage disposal plant, over $25,000, plans $50 deposit; WW. pump plant, over $15,000, plans $50 deposit; steel and concrete water storage facilities, ground and overhead, over $15,000, plans $50 deposit.

Ont., London—University of Western Ontario, Dr. S. Fox, pres., London, sanitary sewers, steel, concrete dam, $25,000. F. W. Farncombe, Bank of Toronto Chambers, engr. CD 10/16—ENR 10/23.

Bids Asked

Tex., Houston—City, installing sanitary sewers, appurtenances, W. Clay, Ancelo, Gross, Newhouse and Oliver Sts. $70,000.

LOW BIDDERS

Ind., Indianapolis—Town Bd., c/o E. H. Orman, pres., Charlestown, Ind., brick, concrete bldg. for sewage plant, from A. F. Jellen & Sons, Box 353, R.R. No. 7, Cincinnati, O. **$85,200.** Lewis S. Finch, 276 Century Bldg., consult. engr.

Md., Hyattsville — Washington Suburban Sanitary Comn., Hamilton St., Aug. 5, Contr. 157-S, vitr. pipe sewers, from Foley & Longo, 55 W. 42 St., New York, N. Y., and Queens Water Pipe Corp., 96-29 Rockaway Blvd., Ozone Park, N. Y. **$47,838.** CD 7/22—ENR 7/30.

Md., Towson—Comrs. Baltimore Co., Court House, Aug. 3, item 2, Contr. 61-S, sanitary sewers vicinity Marlyn Ave., Essex, from Eastern Constr. Co., 224 S. Albemarle St., Baltimore. CD 7/21—ENR 7/23.

†Wash., Kirkland—City, Aug. 3, sewage tr. plant, Docket Wash. 45-151, from C. V. Wilder, 2006 State St., Bellingham, **$109,950. FWA.** CD 7/28—ENR 6/4.

CONTRACTS AWARDED

†California—U. S. Eng., 751 S. Figueroa St., Los Angeles, sewer and water systems, sew-

SEWERS, etc. (Contracts Awarded, Cont'd.)

age disposal plant, No. 141, to Pacific Pipe Line Constr. Co., 8732 Juniper St., Los Angeles. Under **$50,000.**

★ **†California**—U. S. Eng., 751 S. Figueroa St., Los Angeles, sewer, water and sewage disposal system, Riverside Co., to Pacific Pipeland Constr. Co., 8732 Juniper St., Los Angeles. **$500,000-$1,000,000.**

†California—U. S. Eng., 1209 8 St., Sacramento, water, gasoline and waste water disposal sys., Tulare Co., to A. A. Pollia, 695-22 Ave., San Francisco, under **$50,000.**

†Florida—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, sewage plant, sewage lift station and water supply sys., Alachua Co. to Boyd & Goforth, Inc., 1226 W. Forsythe St., Jacksonville, under **$50,000.**

†Illinois—U. S. Eng., U. S. Courthouse & Customhouse, St. Louis, Mo., altering sewer and drain lines, Madison Co. to Tarlton-MacDonald Co., 3615 Olive St., St. Louis, Mo. **$100,000-$500,000.**

★ **†Indiana**—U. S. Eng., Federal Bldg., Louisville, Ky., drainage sys. and pavement, Jackson Co. to Drainage Contractors, Inc., 14375 Schaefer St., Nolan Constr. Co., and Frank S. Tillman, 14101 Plymouth St., Detroit, Mich. **$1,000,000-$5,000,000.**

†Kentucky—U. S. Engineer, U. S. Post Office and Courthouse, Cincinnati, O., sewage collector, water distr. sys., sewage treatment plants, Madison Co., to W. L. Hailey & Co., Cotton States Bldg., Nashville, Tenn. **$100,000-$500,000.**

†Louisiana—U. S. Eng., foot of Prytania St., New Orleans, sanitary sewer and water supply lines, Rapides Parish, to P. Brasher, Alexandria. **$100,000-$500,000.**

†New Mexico — U. S. Eng., Albuquerque, sanitary sewers, sewage disposal plant, San Miguel Co., to M. M. Sundt Constr. Co., Tucson, Ariz. **$100,000-$500,000.**

Okla., Lawton—City, sanitary sewer mains, exten. to Sherman Machine & Iron Works, 18 E. Main St., Oklahoma City, **$79,338.** FWA.

★ **†Tennessee**—U. S. Eng., 306 Court House, Nashville, Tenn., drainage, paving Montgomery Co., to H. E. Wolfe, St. Augustine and J. B. Michael, 1021 Haywood St., Memphis. **$1,000,000-$5,000,000.**

†Texas—U. S. Eng., 25 St. and Ave. F. Galveston, sewage treatment plant, Harris Co., to Brown & Root, Inc., 4300 Calhoun Rd., Houston. Under **$50,000.**

†Texas—U. S. Eng., 25 St. and Ave. F, Galveston, sewage treatment plant, Victoria Co., to Mitchell Darby, Inc., 3612 Leeland St., Houston. **$100,000-$500,000.**

†Texas—U. S. Eng., Albuquerque, N. M., exten. sewer line, Reeve Co., to P. C. Sorenson Co., Pecos. Under **$50,000.**

Tex., Borger—Hycar Chemical Co., Bartlesville, Okla., sanitary sewer collecting lines and facilities for housing area. Force account, $33,400.

†Washington—U. S. Eng., 800 3 Ave., Seattle, sewerage sys., King Co. to Superior Constr. Co., Bway and Yesler Sts., Seattle. **$50,000-$100,000.**

†West Virginia—U. S. Eng., Chesapeake & Ohio Bldg., Huntington, sewage sys., Mason Co. to Sharpsburg Constr. Co., Sharpsburg, Pa. **$100,000-$500,000.**

†Wisconsin—U. S. Eng., 408 Federal Bldg., Milwaukee, sanitary sewers, to George Carlson Co., 4041 N. Montreal St., Milwaukee.

Ont., Mount Hope (Hamilton)—Secretary Dpt. Munitions & Supply, Ottawa, sewers, sewage disposal, water mains, road, etc., at R.C.A.F. Airport, to Industrial Constr. Co., Ltd., Talbor St., St. Thomas. **$34,000.** Bids 7/8. CD 6/30—ENR 7/2.

Ont., Sault Ste. Marie—24 in. rein.-con. and c.i. sewer various streets, to Malvern Constr. Co., Ltd., 648 Danforth Ave., Toronto. **$59,680.**

BRIDGES, GRADE CROSSINGS

PROPOSED WORK

Ky., Louisville—Louisville & Nashville R.R., C. H. Blackman, ch. engr., 10 and Bway., overpass. $350,000.

Pa., Sharon—City, Pub. Utility Comn., City Hall, grade crossing over Pennsylvania and Erie R.R. at Depot St. from Chestnut to South Dock Sts. $25,000.

N. S., Kingston—Dominion Atlantic Ry. Co., J. J. Richardson, engr., Kentville, bridge over Annapolis River, also 2 mi. spur line. $40,000.

Que., Mistassini—Provincial Govt., Quebec City, bridge. $30,000. Dpt. Pub. Wks., Quebec City, engrs.

BIDS ASKED

Bids Asked August 18

Ohio—State Hy. Dpt., Columbus, grading, draining, concrete paving, continuous concrete beam bridge, concrete substructure over West Branch Black River also bridge over Charlemont Creek on .079 mi. Sects. E and F of SH 291, Lorain Co., $181,500; 0.045 mi. continuous concrete girder bridge, concrete substructure over North Fork of Licking River, Sect. F of SH 337, Licking Co., $30,290.

Bids Asked August 21

Idaho—A. C. Merritt, comt. Pub. Wks., Boise, 838 ft. timber bridge across Snake River and approaches on 0.634 mi. Burley-Paul Rd., Cassia and Minidoke Counties.

Bids Asked August 24

†Tennessee—Tennessee Valley Auth., Knoxville, raising bridge over Tennessee River, State Hy. 57, near Kingston, paving approaches, Spec. 2071; Adv. ENR 8/13.

Bids Asked August 25

Washington—State Hy. Dpt., Olympia, reinforcing existing roadbed, constructing steel girder bridge on 14.7 mi. secondary road, Twin to Clallam Bay, Clallam Co. No bids received Aug. 4. CD 7/20—ENR 7/23, under Roads.

Bids Asked August 26

†Arizona-California-Nevada — Bureau Reclamation, Dpt. Interior, Federal Bldg., Yuma, Ariz., highway culvert and pump. plant and railroad culvert, drain line No. 8-B All-American Canal Sys. Boulder Canyon Proj., 5 mi. west of Yuma, Ariz.

Bids Asked August 28

Kentucky—Dpt. Hys., Frankfort, 4 concrete arch culverts, one timber bridge three 14 ft. spans between Morganfield and Uniontown, SP 113-7, Union Co.

LOW BIDDERS

California—State Div. Hys., Pub. Wks. Bldg., Sacramento, Aug. 5, repairing bridge, constructing new concrete deck across Napa River, west city limit Vallejo, Solano Co., from Trewhitt-Shields & Fisher, 1501 Pacific Southwest Bldg., Fresno, **$247,865.** C. H. Purcell, Sacramento, state hy. engr.

Ill., Chicago—Dpt. Pub. Wks., City Hall, Aug. 3, electrical equip. for bridge over Sanitary and Ship Canal, S. Western Ave., from Divane Bros., 3826 W. Van Buren St., **$82,665.** CD 7/30.

Maryland—State Roads Comn. Baltimore, Aug. 4, underpass under Penn. R. R. on N. Point Rd. (dual highway) Contr. BC 169-766, from Fred D. Carrozza, 2444 N. Charles St., Baltimore. **$241,293.** CD 7/28—ENR 7/30.

Michigan—State Hy. Dpt., Lansing, July 29, bridge Wayne Co., from E. J. Vander Veen, 3110 Plainfield Ave., Grand Rapids, **$139,883.** CD 7/22.

Missouri—State Hy. Comn., Jefferson City, July 31, one 160 ft., two 100 ft. rein.-con. arch spans, four 50 ft. and one 45 ft. rein.-con. girder spans, Pulaski Co., from Hannibal Contg. Co., Hannibal, **$273.347*****one 74 ft. and two 60 ft. rein.-con. deck girder spans, Jackson Co., from J. A. Tobin Constr. Co., 3700 Rainbow St., Kansas City, Kan., **$68,622.** Received no bids July 31, one 31 ft. and two 21 ft. creosoted timber spans, Callway Co.

★ **Pennsylvania**—State Hy. Dpt., I. L. Hughes, secy., Harrisburg, Aug. 7, 5 concrete structures, grading, drainage, 2 timber deck I-beam, 1 rein.-con. deck I-beam and concrete abutments for steel stringer bridge, Legislative Route 170, Luzerne Co., from Laub & Collins, Box 546, Somerset, **$608,621.** CD 7/27—ENR 7/30.

CONTRACTS AWARDED

★ **Florida**—State Hy. Dpt., Tallahassee,, (contract reconsidered) 18 bridges, on Overseas Hy. Cut-off between Miami and Key West, Monroe Co., to Cleary Bros. Constr. Co., Georgia Ave., West Palm Beach. **$882,742.** CD 8/3—ENR 8/6 under "Roads, CA".

Pa., Emporium—Pennsylvania R.R., W. D. Wiggins, ch. engr., Broad St. Sta., Phila., 4 bridges over creeks, near here, to Brann & Stuart Co., 1617 Pennsylvania Blvd., Phila.

†Virginia—U. S. Eng., 417 P. O. and Court House Bldg., Norfolk, timber pile bridge, Elizabeth City Co., to Tidewater Constr. Co., 547 Front St., Norfolk. **$50,000-$100,000.**

Washington—State Hy. Dpt., Olympia, approach trestle and ferry slip, reconstructing cradle and dolphins on Point Fosdick Ferry Terminal, near Taoma, Pierce Co., to Hart Constr. Co., E. 11 St. and Hylebos Waterway, Tacoma, **$44,618.** Bids Aug. 4. CD 7/20—**ENR 7/23, under Roads.**

STREETS AND ROADS

BIDS ASKED

Bids Asked August 17

New Jersey—State Hy. Dpt., S. Miller, Jr., comr., Trenton, imprv. 0.785 mi. Fairview St. and Morgan Blvd. Exten., city of Camden, Camden Co.

Bids Asked August 18

Ohio—State Hy. Dpt., Columbus, concrete repairing 3.787 mi. Sect. S-1 and Ripley of SH 7, U. S. 52, Brown Co., est. $26,900; grading, draining, treated stabilized material surfacing, 3 bridges over East Branch Racoon Creek on 1.032 mi. Sec. T D of SH 554, Hooking Co., $92,500; grading, draining, asphaltic concrete paving, bridge over Ice Creek, roadside imprv. 0.183 mi. Sects Coal Grove and Ironton of SH7, U. S. 52, Lawrence Co., $103,400; grading, draining, concrete paving 0.984 mi. Sect. Washingtonville of SH 86, Mahoning and Columbiana Counties, $61,400; 1.729 mi. Sects. U and V of SH 77, U. S. 21, Stark Co.,

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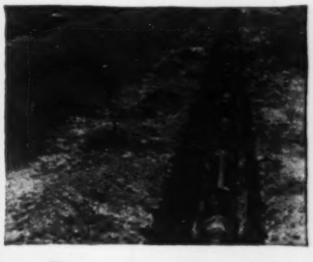

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STREETS, etc. (Bids Asked, Cont'd.)

$35,500; grading, draining, concrete paving, roadside imprv. 0.174 mi. Sect. Beverly of SH 393, Washington Co., $18,180.

Washington—State Hy. Dpt., Olympia, bituminous surfacing 2.68 mi. Graves Rd. and 1.5 mi. Crestline Rd., near Spokane, Spokane Co. B. Bantz, Olympia, dir.

West Virginia—State Road Comn., D. McClaugherty, secy., Charlestown, surface treating 14.9 mi. Keyser Fort Ashby Rd., S.P. 3492 A & B, also 1.1 mi. Fort Ashby Patterson Rd., S.P. 5953, both Mineral Co.

Bids Asked August 19

Louisiana—Dpt. Hys., W. Prescott Foster dir., Baton Rouge, 1000 cu. yd. sand clay gravel on S.P. 901-01-22, St. Tammany Parish; 660 cu. yd. S.P. 901-01-25, Assumption Parish; 5715 cu. yd. S.P. 901-01-26, Franklin Parish.

Bids Asked August 20

Arizona—State Hy. Comn., Phoenix, grading, draining, aggregate base course on Duncan-Clifton Hy., AI-FA-138C (1) (1941-42). W. R. Hutchins, state hy. engr.

Bids Asked August 25

Indiana—State Hy. Comn., S. G. Hadden, chn., Indianapolis, bituminous resurfacing 5.9 mi. Vigo Co.; 7.5 mi. Hendricks and Putnam Counties; 5.45 mi. Starke Co.; 15.64 mi. Starke and LaPorte Counties; 3.45 mi. Allen Co.; 9.16 mi. Fort Wayne Hy Dist.; 9.05 mi. Crawford and Harrison Counties; 4 mi. LaPorte Co. R. Bower, ch. engr. No bids received Aug. 4. CD 7/24 and 8/7—ENR 7/30.

Washington — State Hy. Dpt., Olympia, stockpiling on State Rds. 2 and 15, secondary Rd. 15-C, Iron Creek to junction State Rd. 15 summit of State Rd. 15 to Winton and secondary road, Leavenworth to Plain, Chelan and Kittitas Counties; State Rds. 10 and 16, secondary Rd. 10-A, Chelan and Okanogan Counties; State Rds. 2 and 7, Douglas and Grant Counties; clearing, grading, draining, surfacing road from Chapin Creek to Johns River, Gary Harbor Co., clearing, grading, draining, surfacing, stockpiling 4.8 mi. State Rd. 12, secondary Rd. 13, Skinville cutoff to Chinook River and Raymond west, Pacific Co. B. Bantz, Olympia, dir.

Bids Asked August 26

La., Baton Rouge—City Comn. Council, office F. S. Le Nlanc, mayor, City Hall Bldg., 10,500 sq. yd. concrete paving N. 22 St. from Florida St. to Plank Rd. E. G. Blakewood, Jr., City Hall, engr.

Nebraska—State Dpt. Roads & Irrigation, Lincoln, rejected bids Aug. 6, imprv. SN-FA2-78, Millard Wahoo Rd. and SNFA 235, Millard-Wahoo Rd. CD 8/3—ENR 8/10.

Bids Asked August 28

Kentucky—Dpt. Hys., Frankfort, grading, draining, high type surfacing 3.754 mi. Bowling Green - Franklin Rd., SN-FA 370C (1), SN-FA 370C (2), SP 114-188, Warren Co.; rock asphalt seal construction of 9.271 mi. Danville-Stanford Rd., SP 11-120, SP 69-10, Boyle-Lincoln Co., 3.541 mi. London-Corbin Rd., SN-SP 63-111, Laurel Co., 10.549 mi. Stanford-Mt. Vernon Rd., SP 69-70, Lincoln Co., 1.985 mi. Russellville-Auburn Rd., MP 71-101 A, Logan Co.; roadside improvements 6.497 mi. Louisville-Cincinnati Rd., SP 56-18, SP 93-196, Jefferson-Oldham Counties.

Bids Asked

Louisiana—Dpt. Hys., Baton Rouge, received no bids July 29, imprv. roads 6.207 mi. Bossier and Webster Parishes; 12.521 mi. Rapids Parish and 9.06 mi. Rapids Parish. CD 7/21—ENR 7/23.

Maryland—State Roads Comn., Baltimore, recalled bids to have been opened Aug. 4, graveling, surfacing 6.17 mi. Three Notch Rd., St. Marys Co., Constr. S.M. 255-566; 6.429 mi. Three Notch Rd., St. Marys Co., Contr. S.M. 253-566. Will readvertise. CD 7/28—ENR 7/30.

†North Carolina—U. S. Eng., Charlotte, concrete paving, and drainage.

Washington—State Hy. Dpt., Olympia, received no bids Aug. 4, imprv. State Hy. 3-A, Grays Harbor Co. CD 7/20—ENR 7/23.

LOW BIDDERS

★**California**—State Div. Hys., State Bldg., Los Angeles, Aug. 6, imprv. 4.7 mi. 8 St. and Harbor Dr., San Diego Co. (XI-SD-Harbor Dr.), from V. R. Dennis Constr. Co., P. O. Box F, Hillcrest Sta., San Diego. **$694,167.** CD 7/17—ENR 7/23.

Georgia—State Hy. Comn., W. E. Wilburn chn., Atlanta, July 31, imprv. 9.38 mi. Hollywood-Toccoa Rd., Habersham and Stevens Counties, from R. H. Wright & Son, Columbus, **$460,124*****6.473 mi. Canton Waleska Rd., Cherokee Co., from Whitley Constr. Co., La Grange, **$153,785*****grading and surfacing 0.629 mi. bridge over Chattahoochee River, Fulton and Cobb Counties, from E. A. Hudsons Sons, Bolton, **$63,040*****2.679 mi. Fulton Co., from Sam Finley Inc., 292 North Ave. N.W., Atlanta, **$52,100.**

Idaho—State Dpt. Pub. Wks., Bur Hys., Boise, July 31, imprv. 7.153 mi. Sawthook Park Hy. and also 18.038 mi. Lemhi Hy. Clark Co., bituminous surface treating 9.358 mi. Lemhi Hy., Lemhi Co., from D. J. Cavanagh, Twin Falls, **$56,450** and **$83,431** respectively ***17.692 mi. Lemhi Hy., Lemhi Co., from Nick Burggraf, Inc., Idaho Falls, **$86,484.**

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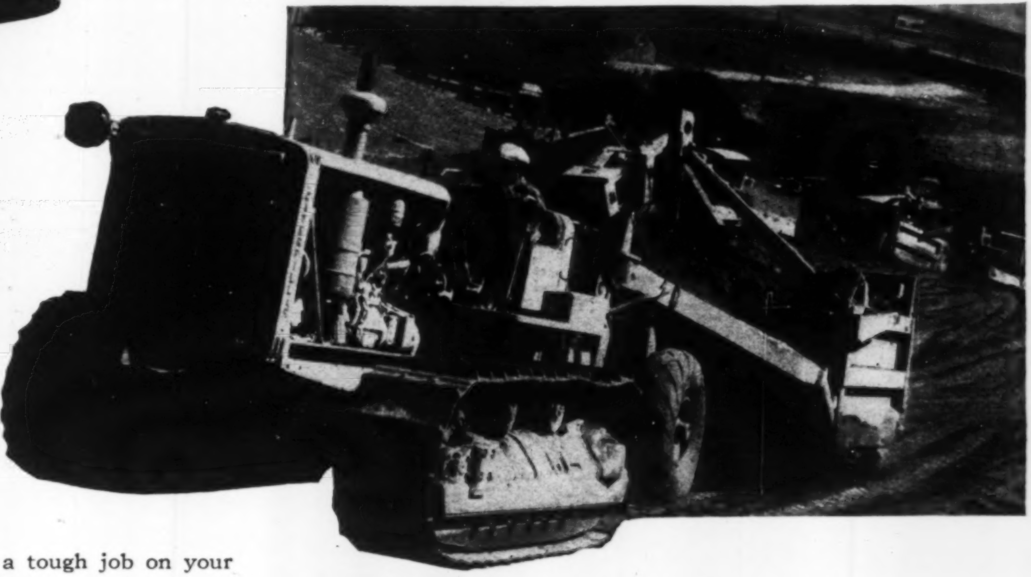

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STREETS, etc. (Low Bidders, Cont'd.)

★**Illinois**—State Dpt. Pub. Wks. & Bldgs., Div. Hys., Springfield, July 31, from Milburn Bros. Inc., and John A. McGarry & Co., 189 W. Madison St., Chicago, imprv. 3.77 mi. Grundy Co., **$264,600**, 3.84 mi. Grundy and Livingston Counties, **$214,171**, Combination No. 2, Grundy Co., **$435,498*****Fairview Constr. Co., Decatur, 6,031 sq. yd. concrete. Green and Jersey Counties, **$97,576*****McCarthy Improvement Co., 601-3 Kahl Bldg., Davenport, Ia., 5,595 sq. yd. concrete, Henry, Knox and Bureau Counties, **$49,292*****from A. P. Munsen, Marion, Ia., concrete patching McDonough, Warren and Schuyler Counties, **$46,463*****from Edwardsville Constr. Co., Edwardsville, 3.84 mi. Montgomery and Macoupin Counties, **$295,778*****from C. J. Moritz, Inc., Effingham, 1,510 sq. yd. concrete patching Perry and Washington Counties, **$64,723*****from Triangle Constr. Co., 485 N. Wilwood St., Kankakee, 2.3 mi. Pulaski Co., **$34,581.** Received no bids July 13, 0.58 mi. Tazewell Co., 7,373 sq. yd. St. Clair, Randolph and Washington Counties, 5,029 sq. yd. concrete patching St. Clair, Monroe and Randolph Counties, imprv. roads, Bureau, LaSalle, Carroll, Ogle and Jo Daviess Counties, combination No. 3 Jackson Co.; 48 mi. Jackson Co., 3.4 mi. Jackson Co.; 1.81 mi. Bureau Co., 554 sq. yd. Franklin and Williamson Counties. CD 7/21—ENR 7/23.

Ill., Chicago—Dpt. Pub. Wks., O. E. Hewitt, comr., City Hall, Aug. 4, concrete paving S. Jefferson St., W. Roosevelt Rd. to W. Harrison St., from H. G. Goelitz Co., 5757 W. Ogden Ave. **$83,258.** CD 7/28—ENR 7/30.

Indiana—State Hy. Comn., S. G. Hadden, chn., Indianapolis, Aug. 4, imprv. 10.54 mi. Clinton Co., from W. L. McGaw, Hawkins Rd., Richmond, **$31,999**, est. $39,917***7.87 mi. Pulaski Co., from Hipskind Drainage Co., 1725 Winter Sy., Fort Wayne, **$152,756**, est. $155,025***1.2 mi. Lake Co., from J. C. O'Conner & Sons, 2104 Miner St., Fort Wayne, **$70,078**, est. $77,570***2.07 mi. Allen Co., from Brooks Constr. Co., 1123 Barthold St., Fort Wayne, **$37,765**, est. $39,629***4.53 mi. Jay Co., from Meshberger Bros., Linn Grove, **$51,771**, est. $53,906***13.89 mi. Ripley and Dearborn Counties, from N. E. Daugherty Co., Bloomington, **$42,800**, est $49,112***1.786 mi. Martin and Daviess Counties, from McMahan Constr. Co., Rochester, **$90,209**, est. $98,119. CD 7/24—ENR 7/30.

Michigan—State Hy. Dpt., Lansing, July 29, imprv. 0.901 mi. Macomb Co., from F. J. Knight Co., 3681 Dunn Rd., Detroit. **$109,797.** CD 7/22.

Missouri—State Hy. Comn., Jefferson City, July 24, imprv. 1.738 mi. Johnson Co., from L. W. Hayes, Bethany. **$46,298.** CD 7/16.

Missouri—State Hy. Comn., Jefferson City, July 31, from Hannibal Contg. Co., Hannibal, imprv. 2.146 mi. Newton Co., **$176,191**, 2.465 mi. Newton Co., **$176,191*****from O'Dell & Riney Constr. Co., Hannibal, 1.088 mi. Pulaski Co., **$289,173**, 1.038 mi. Pulaski Co., **$105,347**, 0.717 mi. Phelps Co., **$165,508**, 1.735 mi. Pulaski Co., **$390,354*****2.454 mi. McDonald Co., from E. D. Tyner Constr. Co. and J. M. Roark & Son, Anderson, **$193,881*****from Boone & Herbst, Clayton, 2.145 mi. St. Charles Co., **$185,299.**

★**New Jersey—S. Mille, Jr., state hy comr.** Trenton, Aug. 3, imprv. 2.2 mi. Route 39, Sect. 1 C and 2 A, from Union Building & Constr. Co., 631 Main Ave., Passaic. **$694,866.** CD 7/22—ENR 7/30.

New York—A. W. Brandt, supt. Pub. Wks., Albany, July 31, imprv. 0.47 mi., Orange Co., from Cardinale & Girando, White Plains. **$43,934.** CD 7/21—ENR 7/23.

Ohio—State Hy. Dpt., Columbus, July 28, imprv. 2.501 mi. Lorain Co., from Ohio Eng. Co., 105 6 St., Lorain, **$137,275**, est. $137,400. CD 7/15—ENR 7/23.

★**Pennsylvania** — State Hy. Dpt., I. L. Hughes, secy., Harrisburg, Aug. 7, imprv. 6844 ft., Phila Co. and 20,272 ft. Bucks Co., from Union Paving Co., 1227 N. Broad St., Phila., **$176,191** and **$362,625** respectively***4,808 ft. Phila Co., from Louis Dalente & Sons, 5122 Master St., Phila., **$196,028*****3,989 ft. Phila Co., from Frank R. Curtis, State Rd. and Unruh St., Phila., **$301,575*****950 ft. Lackawanna Co., from C. W. Wagner & Son, 19 Turner St., Plymouth, Pa., **$107,969*****292 ft. bridge, imprv. road Wayne Co., from Harvey & Flory, 321 N. Courtland St., East Stroudsburg, **$31,982.**. Received no bids Aug. imprv. 29,550 ft. Adams Co. CD 7/27—ENR 7/30.

Texas—D. C. Greer, state hy. engr., Austin, July 24, imprv. 7.097 mi. hy. Dallas Co., from Ben Sira & Co., 3901 Elm St., Dallas. **$221,455.** CD 7/30—ENR 8/6, under LB.

Washington—B. Bantz, dir. Hys., Olympia, Aug. 4, imprv. 1.1 mi. Clark Co., from Kuckenberg Constr. Co., 11104 N.E. Holman St., Portland, Ore. **$68,386.** CD 7/30.

†Washington—Bureau Reclamation, Coulee Dam, July 31, relocating county road between Fort Spokane and Creston, Spec. 1042, from L. A. Woodward Co., Missoula, Mont., **$168,196**, Sched. 1, **$91,617** Sched. 2. CD 7/8—ENR 7/16, under EDIW.

Wash., Seattle — City, Aug. 6, removing street railway tracks, repairing, restoration 1 Ave. and 1st Ave. S, Denny Way to Atlantic St., from T. Romano, 1833 Dearborn St. **$88,221.** CD 7/28--ENR 7/30.

CONTRACTS AWARDED

†Alabama—U. S. Eng., U. S. Courthouse & Customhouse, Mobile, grading, paving, grassing, drainage, constructing timber bridge and drainage structures, Dale Co., to [illegible] C. Foster, Ozark. **$100,000-$500,000.**

★**†Alabama**—U. S. Eng., 306 U. S. Courthouse, Nashville, Tenn., paving to H. E Wolf and J. B. Michael, Courtland. Under **$3,000,000.**

†Arkansas—U. S. Eng., 300 Bway., Little Rock, gravel surface roads, Crawford Co., to E. E. Barber Constr. Co., 15[illegible] George St., Fort Smith. Under **$50,000.**

†Arkansas—U. S. Eng., 300 Bway., Little Rock, sidewalks, parking areas, Pulaski Co., to D. F. Jones Constr. Co., Inc., So. Natl. Bank Bldg., Little Rock. Under **$50,000.**

†Arkansas—U. S. Eng., P. O. Box 97, Memphis, Tenn., roadwork, storm drainage, pistol and rifle range, Mississippi Co., to Forcum-James Co., Dyersburg, Tenn. **$100,000-$500,000.**

California—U. S. Eng., Wright Bldg., Sacramento, road mix surfacing, Kern Co., to J. E. Haddock, Ltd., Pasadena. **$100,000-$500,000.**

†California—U. S. Eng., 741 S. Figueroa St., Los Angeles, concrete roadway, San Luis Obispo Co., to Brown, Doko & Baun, Pismo Beach. Under **$50,000.**

†California—U. S. Eng., 751 S. Figueroa St., Los Angeles, street imprvs., Riverside Co. to J. Wilcox, Alhambra. **$100,000-$500,000.**

†Colorado—U. S. Eng., 1709 Jackson St., Omaha, Neb., grading, Denver Co., to Blanchard Bros., Cheyenne, Wyo. **$100,000-$500,000.**

†Florida—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, grading, paving roads, Dade Co., to W. T. Price Dredging Co., 3200 SW 27 Ave., Miami. Under **$50,000.**

†Georgia—U. S. Eng., Post Office Bldg., grading, paving roads and streets, Liberty Co., to Latham Bros. Constr. Co., West Palm Beach, Fla. **$100,000-$500,000.**

†Georgia—U. S. Eng., 494 Spring St., S.W., Atlanta, roads, paving Walker Co., to D. L. Brown, 522 W. Manning St., Chattanooga, Tenn. **$50,000-$100,000.**

Ill., Alton—City, imprv. 0.8754 mi. Sect. 24-CS, to Hartong & Co., 33 N. LaSalle St., Chicago. **$59,980.** Bids 7/20. CD 7/14.

†Indiana—U. S. Eng., 612 Federal Bldg., Louisville, Ky., roads, Jackson Co., to Ralph Myers Constr. Co., Salem. **$100,000-$500,000.**

†Maryland—U. S. Eng., Standard Oil Bldg., Baltimore, road construction, painting, Baltimore Co., to James Gibbons Co., Relay. **$50,000-$100,000.**

†Maryland—U. S. Eng., Standard Oil Bldg., Baltimore, access road and railroad, Harford Co., to H. R. Miller Co., Lancaster, Pa. **$100,000-$500,000.**

Md., Baltimore—City, Bd. Awards, City Hall, cement concrete paving, Contr. 168, to Arundel Constr. Co., 910 Trinity St. **$36,141.**

†Nebraska—U. S. Eng., 1709 Jackson St., Omaha, roads and parking areas, to Peter Kiewit Sons Co., Omaha Natl. Bank Bldg., Omaha. **$100,000-$500,000.**

†New Mexico—U. S. Eng., Albuquerque, roads, drainage, San Miguel Co., to Henry Thygesen & Co., Albuquerque. **$50,000-$100,000.**

New Mexico—B. F. Dwyre, state hy. engr., Sante Fe, imprv. 18.296 mi. Colfax Co., to Martin & Cowart, Albuquerque, **$253,508**, est. $322,948; 12,858 mi. San Miguel Co., to Skou-Martin & Cowart, Albuquerque, **$253,508**, est. $162,382. Bids 8/6. Awarded 8/6. CD 7/28—ENR 7/30.

★**Ohio**—State Hy. Dpt., Columbus, imprv. 4.39 mi. Scioto Co., to S. Monroe & Sons Co., 2640 Gallia St., Portsmouth, and W. J. Seidensticker Co., P. O. Box 26, Bexley Station, Columbus, **$434,953*****1.611 mi. Miami Co., to Bonsman Washed Sand & Gravel Co., P. O. Box 506, Troy, **$36,481*****13.04 mi. Lorain Co., to H. J. Hart, 912 Middle Ave., Elyria, **$45,132.** Grand total $516,566. Received no bids July 28 imprv. 1.81 mi. Columbiana Co., 2.093 mi. Franklin Co., 35.54 mi. Portage, Stark, Summit, Trumbull and Mahoning Counties. Bids 7/28. CD 7/15—ENR 7/2.

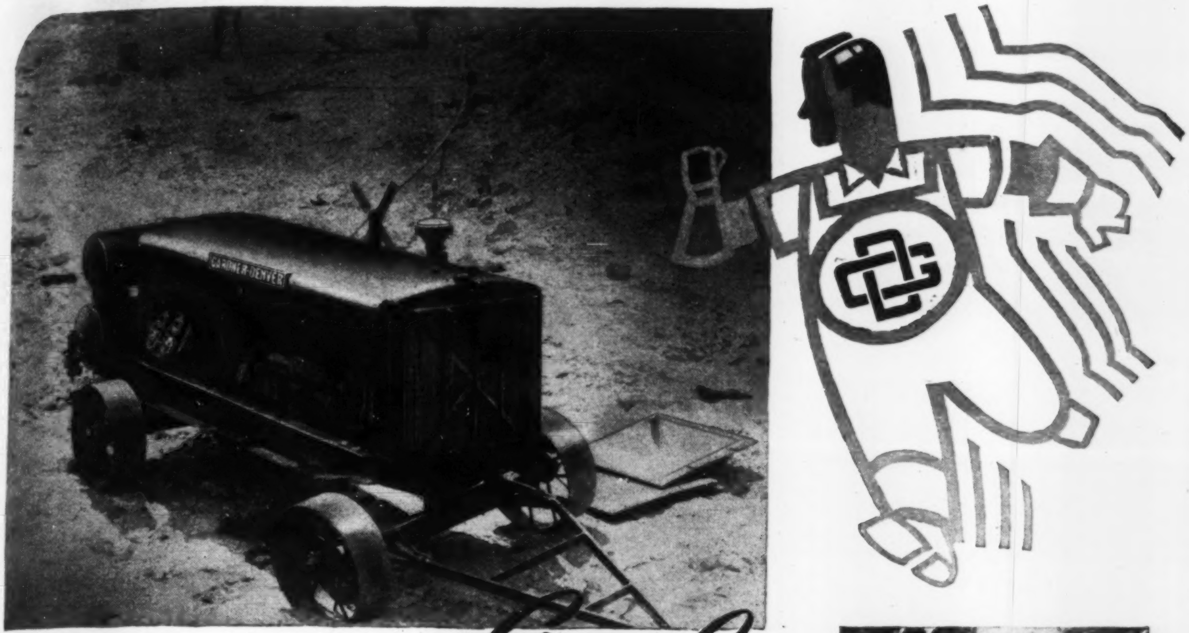
†Oklahoma—U. S. Eng., 416 Wright Bldg., Tulsa, access roads, Oklahoma Co., to Midwest Materials & Constr. Co., Cotton Exchange Bldg., Oklahoma City. Under **$50,000.**

†Oklahoma—U. S. Eng., 416 Wright Bldg., Tulsa, roads, drives, walks, parking area and storm drainage sys., Mayes Co., to J. L. Pohl, Nevada, Mo. Under **$50,000.**

†South Carolina—U. S. Eng., 33 Customhouse, Charleston, bituminous surfacing roads and parking areas, Richland Co., to Ambrose Harwell, Carolina Life Bldg., Columbia. **$50,000-$100,000.**

Tennessee—U. S. Eng., P. O. Box 97, Memphis, clearing, grubbing, constructing timber bridges, clay gravel roads, pipe culverts, Shelby Co., to Forcum-James Co., Dyersburg. **$50,000-$100,000.**

†Texas—U. S. Eng., Cotton Exchange Bldg., Dallas, streets, walks, drainage, Dallas Co., to Uvalde Constr. Co., Santa Fe Bldg., Dallas. Under **$50,000.**



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STREETS, etc. (Contracts Awarded, Cont'd.)

†Texas—U. S. Eng., 25 St. and Avenue F, Galveston, bituminous paving, McClennan Co., to Thomas & Ratliff, Rogers. Under **$50,000.**

†Texas—U. S. Eng., San Antonio, roads, walks, Bell Co., to Southern States Constr. Co., San Jacinto Life Bldg., Houston. Under **$50,000.**

†Texas—U. S. Eng., San Antonio, roads, sidewalks, fencing, Bexar Co., to D. Word, 446 E. Rosewood St., San Antonio. Under **$50,000.**

†Texas—U. S. Eng., Fort Sam Houston, Part D, concrete paving in hard-standing area, to Southern States Constr. Co., San Jacinto Life Bldg., Houston. Under **$50,000.**

Utah—State Road Comn., Salt Lake City, bituminous surfacing 8.219 mi. roadway between Knolls and Wendover, Toole Co., to Carl E. Nelson, Logan, **$297,950,** engrs. est. $237,877. Bids 7/31.

†Washington—U. S. Eng., 800 3 Ave., Seattle, grading, constructing roads, King Co., to A. W. Johnson Co., Inc., 208 E. Pacific St., and Goetz & Brennan, Seaboard Bldg., Seattle. **$50,000-$100,000.**

†Washington—U. S. Eng., Textile Tower, Seattle, road, to L. Romano Engineering Corp., 1300 Dearborn St., Seattle. Under **$50,000.**

West Virginia—State Road Comn., Charleston, imprv. S.P. 2197 and 3403, Doddridge Co., to Fuccy Bros., Weston, **$92,154;** S.P. 5304 and 6357, Merce Co., to Middle State Bituminous Corp., Ironton, O., **$25,810.** Bids 8/5. CD 7/27—ENR 7/20.

★ **Quebec**—Provincial Govt., Quebec City, imprv. 9.5 mi. St. Jerome-Piedmont Sect. Hy. 11, to Local Constr. Co., Ltd., 4740 Iberville St., Montreal **$365,740*****13.79 mi. Sir Wilfred Laurier Hy., sect. from St. Francois River to Nicolet River, in Windsor, Simpson, Notre Dame de Bon Couseil, to Cyprien Gagnon, 220 Grand Allee, Quebec City, **$284,743*****9.5 mi. section from southwestern branch Nicolet River to limits between Ste. Eulalie and Ste. Anne du Sault in St. Leonard and Ste. Eulalie, to Fabi & Sons, 33 Brewster St., Sherbrooke, **$159,465***** section from limits between Ste. Eulalie and Ste. Anne de Sault to Becancour River in Ste. Anne de Sault and St. Louis de Blandford, also section from Becaucour River to limits between St. Joseph de Blandford and Villeray in St. Louis de Blandford and St. Joseph de Blandford, to Armand Sicotte, 1906 Horne Ave., Montreal, **$199,198** and **$223,969** respectively***paving hy. from Val David to Mont Rolland, to Highway Paving Co., 6301 Park Ave., Montreal, **$72,000.** Grand total. $1,305,115. Bids 7/28. CD 7/23.

EARTHWORK WATERWAYS

PROPOSED WORK

★ **†Texas**—International Boundary Comm., c/o J. L. Lytle, proj. engr., Farmers Bank Bldg., San Benito, flood control, power and irrigation work, Lower Rio Grande Valley, Cameron Co., incl. 72 mi. long inlet canal, Los Olmos Reservoir, Los Olmos hydroelectric plant, 30 mi. feeder canal, 67 mi. distributing canal and supplemental storage dams. Total est. $65,000,000. R. J. Cummings, Bankers Mortgage Bldg., Houston, E. N. Noyes, Tower Petroleum Bldg., Dallas, and A. Tamm, Harlingen, consult. engrs.

Ont., Midland—Secretary Dpt. Pub. Wks., Ottawa, bids soon dredging harbor. $36,200.

BIDS ASKED

Bids Asked August 24

†Colorado—Bur. Reclamation, Estes Park, preparation of concrete aggregates canal gravel deposit, Colorado-Big Thompson project, Stec. 1660-D, near Grand Lake.

Wash., Tacoma — City, Bd. Contracts & Awards, City Hall, control cable for La Grande and Alder powerhouses, Second Nisqually power development.

Bids Asked September 2

La., Abbeville—Bd. City Comrs., Courthouse Bldg., dredging 500,000 cu. yd. excav. Bids July 22 rejected. R. I. Tanner, Abbeville, engr. CD 7/6—ENR 7/9.

LOW BIDDERS

La., Pointe-ala-Hache—City, Aug. 4, from E. De Armas, Venice, replacing, driving new pile, repairing both ferry wharfs $4.30 per lin. ft.; 180 lin. ft., cresoted wooden revetment $8.15 per lin. ft., 650 cu. yd. earth fill, $1.01 per cu. yd. CD 7/22—ENR 7/30.

CONTRACTS AWARDED

†Alabama—U. S. Eng., U. S. Courthouse & Customhouse, Mobile, dredging, Mobile Co., to Standard Dredging Corp., Inc., Whitney Bldg., New Orleans, La., **$50,000-$100,000.**

†California—U. S. Eng., 751 S. Figueroa St., Los Angeles, flood control channel Los Angeles Co., to Southern Pacific Co., 65 Market St., San Francisco, under **$50,000.**

†California—U. S. Eng., 1209 8 St., Sacramento, piling and cement levee construction, Yuba Co., to Piombo Bros. & Co., 1571 Turk St., San Francisco, **$100,000-$500,000.**

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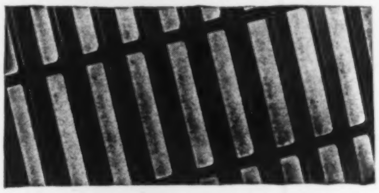

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EARTHWORK, etc. (Contracts Awarded, Cont'd.)

Ia., Council Bluffs—Cleaning out Indiana Creek, day labor. **$15,000.** CD 7/28—ENR 7/28.

†**Kentucky**—U. S. Eng., 612 Federal Bldg., Louisville, flood protection embankments and walls, McCracken Co., to Kentucky Utilities Co., Paducah, under **$50,000.**

★†**Montana**—U. S. Eng., Administration Bldg., Fort Peck, excavating, filling, grading, drainage facilities, paving, etc., Fergus Co., to S. Birch & Sons Constr. Co., Force Bldg., Great Falls, **$1,000,000-$5,000,000.**

★†**Montana**—U. S. Eng., Administration Bldg., Fort Peck, excavating, filling, grading, paving, Glacier Co., to F. J. Haas, 512 9 St. N.W., Great Falls, **$1,000,000-$5,000,000.**

★†**Montana** — U. S. Eng., Administration Bldg., Fort Peck, excavating, filling, grading, construction drainage facilities, paving and boundary fence and gates, Valley Co., to Inland Constr. Co., 3867 Leavenworth St., Omaha, Neb. **$1,000,000-$5,000,000.**

†**New Jersey**—U. S. Eng., 6 and Walnut Sts., Phila., Pa., clearing, grubbing and excavation and constructing rubble stone jetties to Eastern Engineering Co., 4 N. North Carolina Ave., Atlantic City, **$100,000-$500,000** and **$50,000-$100,000** respectively.

†**North Carolina**—U. S. Eng., 308 Custom, Wilmington dredging, Carteret Co., to C. Walker Hodges Dredging Co., Inc., New Bern, under **$50,000.**

†**Ohio**—U. S. Eng., 960 Ellicott Square Bldg., Buffalo, N. Y., dredging Cuyahoga Co., to Great Lakes Dredge & Dock Co., Williamson Bldg., Cleveland. **$50,000-$100,000.**

†**Pennsylvania** — U. S. Eng., Standard Oil Bldg., Baltimore, Md., erosion control and surface drainage, Lancaster Co., to C. W. Good, Inc., 726 Columbus Ave., Lancaster, Pa., **$50,000-$100,000.**

UNCLASSIFIED

PROPOSED WORK

★†**Ark., Little Rock**—AIR FORCE INSTALLATION—U. S. Eng., 300 Bway., air force installation Adams Field, exceeds $4,000,000.

†**Connecticut**—GRADING, etc.—Public Housing Auth., NHA, 24 School St., Boston, Mass., soon takes bids grading, landscaping, drainage, for housing projects, Conn. 6071 and 6072. CD 7/27—ENR 7/30.

†**Florida**—BLACKOUT FACILITIES—U. S. Eng., U. S. Courthouse and Post Office, Jacksonville, engineer-architect services by R. L. Weed, Miami, blackout facilities, Dade Co.

Kan., Newton—AIRPORT—Approved $45,000 bonds, imprv. airport. CD 7/9—ENR 7/17.

Kan., Topeka—AIRPORT—F. J. Warren, mayor, airport imprvs., runways, surfacing taxi strips, filling creek channel, etc. $50,000. Application made to CAA.

★†**Missouri**—IMPROVEMENTS—U. S. Eng., P. O. Box 97, Memphis, Tenn., plans by Axon, Inc., 4903 Delmar St., St. Louis, imprvs., under $5,000,000.

★**Mo., St. Louis** — AIRPORT IMPROVEMENTS — Voted $4,500,000 bonds (citys share) expanding, imprv. Lambert-St. Louis Airport at Robertson, St. Louis Co. Total est. $9,000,000. CD 5/18—ENR 5/21.

†**New Hampshire**—U. S. Eng., 31 St. James Ave., Boston, Mass., architect-engineer services by Fay, Spofford & Thorndike, 11 Beacon St., Boston, Mass., wharf exten.

★†**New Jersey**—GRADING, etc.—U. S. Eng., 6 and Walnut Sts., Phila., Pa., fine grading and paving, topsoiling, etc. Plans $25 deposit.

†**New Mexico**—FUELING SYSTEM—U. S. Eng., Albuquerque, fueling sys.

†**South Dakota**—RUNWAYS, etc.—U. S. Eng., 1709 Jackson St., Omaha, Neb., engineer-architect services by W. J. Dixon and C. A. Trimmer, Mitchell, runways, taxiways, hardstandings, Davison Co.

†**Texas**—IMPROVEMENTS—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., imprvs. bldgs., $4,500,000; installing sewers, over $25,000; grading and drainage facilities; natural gas lines, facilities, over $25,000; water lines and facilities, over $15,000.

★†**Texas**—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, imprvs. buildings, Matagorda Co. $3,000,000.

†**Texas**—IMPROVEMENTS—U. S. Eng., Fort Sam Houston, soon takes bids imprvs. Spec. 42-268. Plans $25 deposit.

★**Texas** — IMPROVEMENTS — U. S. Eng., Albuquerque, N. M., imprvs., bldgs., etc., Ward Co. $2,500,000.

★†**Texas**—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, imprvs. bldgs., Brazos Co. $3,500,000.

†**Texas**—GASOLINE FUELING SYSTEM, etc.—U. S. Eng., Albuquerque, N. M., plans by Haynes and Strange, Parkhill, Voelcker & Dixon, Associates, Lubbock, gasoline fueling sys. and oil storage facilities, Lubbock and Presidio Counties.

†**Washington**—IMPROVEMENTS—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave., N. W., Wash., D. C., improvements, for Coast Guard.

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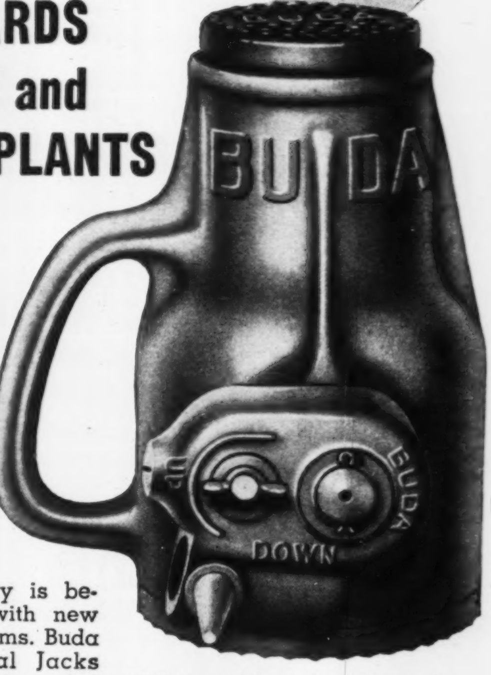

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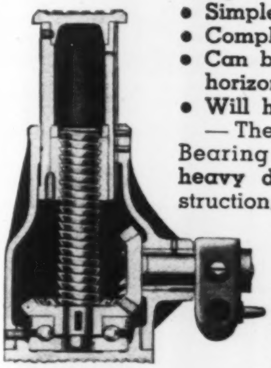

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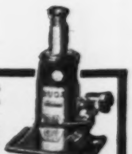
(RIGHT): Buda Hydraulic Jacks —Single and 2-speed models for loads up to 25 tons . . . THESE ARE JUST 3 OF MORE THAN 170 BUDA JACK MODELS—*WRITE FOR DETAILS.*



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B. C., Port Alberni—WHARF, etc.—Secretary Dpt. Pub. Wks., Ottawa, Ont., bids soon repairing assembly wharf and approach, also exten. shed. $62,900.

N. S., Halifax—WHARF—North Atlantic Co., Ltd., 611 Nova Scotia Bank Bldg., reconstructing wharf.

N. S., Mulgrave—WHARF—Secretary Dpt. Pub. Wks., Ottawa, Ont., railway wharf, $77,800.

Ont., Toronto—BREAKWATER—Secretary Bd. Control, Toronto, bids soon 500 ft. concrete breakwater, 60 ft. center opening, east of Strachan Ave., for city. $40,000.

BIDS ASKED

Bids Asked August 17

†New Jersey — PLANTING, etc. — Public Housing, NHA, 270 Bway., New York, N. Y., planting and sodding at housing project.

Bids Asked August 18

†Connecticut — LANDSCAPING, etc. — Bridgeport Housing Auth., 2[illegible] Hallett St., Bridgeport, landscaping and grading for housing project Conn. 6054, for NHA. Est. $25,000. Plans $10 deposit. C. W. Walker, 1115 Main St., Bridgeport, archt.

Bids Asked

†Arkansas—IMPROVEMENTS—U. S. Eng., U. S. Post Office & Courthouse, Vicksburg, Miss., imprvs., Inc. 1106-43-31. Plans deposit $25.

†New Mexico—NATURAL GAS DISTRIBUTING SYS.—U. S. Eng., Albuquerque, installing natural gas distr. sys., etc. Est. $25,000. Plans $25 deposit.

†Texas—STORAGE SYSTEM, etc.—U. S. Eng., Albuquerque, N. M., A. C. gasoline and fuel storage sys., dispensing sys., steel tanks, piping, etc., pump. sta. $60,000. Plans $25 deposit.

†Texas—CLEARING, etc.—U. S. Eng., Fort Sam Houston, clearing, blading, fencing, area No. 4, Spec. 420238. Over $25,000. Plans $25 deposit.

†Texas—GASOLINE AND FUEL STORAGE FACILITIES—U. S. Eng., 231 W. Main St., Denison, addl. gasoline and fuel storage. $80,000. Plans $25 deposit.

LOW BIDDERS

†Alabama — GRADING, etc. — U. S. Eng., U. S. Courthouse & Customhouse, Mobile, July 30, grading, paving, utilities, Inv. 569-43-34, from Ledbetter & Johnson Co., Rome, Ga. **$100,000-$500,000.**

Calif., Morrow Cove—WHARF—State Div. Architecture, Pub. Wks. Bldg., Sacramento, timber whaft, tee shaped, deck area 9350 sq. ft., etc., from M. A. Jenkins, 3560 Bway., Sacramento. **$47,000.** CD 7/27.

†Nevada—IMPROVEMENTS—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., Aug. 4, imprvs. bldgs., utilities, roads, Inv. 140, from L. H. Hansen & Sons, Box 1784, Fresno, Calif. CD 7/30.

New York—TOPSOILING, etc.—New York City Housing Auth., 122 E. 42 St., New York, Aug. 6, topsoiling and planting for Edwin Markham Housing Project, for NHA, from Roman Landscaping Contg. Co., 551 5 Ave., New York, **$40,990.** CD 7/21—ENR 7/23.

†Texas — IMPROVEMENTS — U. S. Eng., Fort Sam Houston, about July 29, imprvs. housing, etc., Spec. 42-224, from F. A. Nunnelly, 118 Delaware St., San Antonio. **$169,000.** CD 7/24—ENR 7/30.

†Texas—CLEARING—U. S. Eng., Fort Sam Houston, clearing, blading, area fencing, area No. 4, Spec. 42-238, from J. Skelton, 225 Tuxedo St., San Antonio, under **$50,000.** CD 8/5.

★ **†Texas** — IMPROVEMENTS — U. S. Eng., Fort Sam Houston, July 28, imprvs., Spec. 42-223, from R. W. Briggs and M. B. Killian, P. O. Box 1986, San Antonio.

★ **Wash., Seattle**—DAM—City, County-City Bldg., Aug. 6, raising Ross Dam, from General Construction Co., J. F. Shea and Morrison-Knudsen Co., Inc., 3840 Iowa St., **$6,146,214;** furnishing cement from Superior Portland Cement Inc., Seaboard Bldg., **$927,676.** CD 7/24—ENR 7/30.

Wash., Seattle—DAM—City, County-City Bldg., Aug. 6, two 72 in. and two 48 in. discharge regulating valves needed for raising Ross Dam from S. Morgan Smith Co., York, Pa., **$57,700.** Received no bids Aug. 6, two self closing sluice gates for Ross Dam. CD 7/24—ENR 7/30.

CONTRACTS AWARDED

†Alabama—FIRE ALARM SYSTEM—U. S. Eng., U. S. Courthouse & Customhouse, Mobile, automatic fire alarm sys., Dallas Co., to American District Telegraph Co., 155 Sixth Ave., New York, N. Y. Under **$50,000.**

†Arizona — RELOCATING SUBSTATION — U. S. Eng, 751 S. Figueroa St., Los Angeles, Calif., relocating electrical substation, Pima Co., to Tucson Gas Electric Light and Power Co., Tucson. Under **$50,000.**

★ **†Arizona**—LANDING MATS—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., concrete landing mats, Pima Co., to Pearson & Dickerson Contractors, Inc., Lee Moore

UNCLASSIFIED (Contracts Awarded. Cont'd.)

Contg. Co., Tempe Stone Co., Tanner Constr. Co., Oswald Bros. and J. A. Casson Co., 731 N. 19 Ave., all of Phoenix. **$1,000,000-$5,000,000.**

★ **†Arizona**—LANDING MAT, etc.—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., landing mat and facilities, Yuma Co., to Tanner Constr. Co., 731 N. 19 Ave., Phoenix. **$500,000-$1,000,000.**

†Arkansas—FIRE ALARM SYSTEM— U. S. Eng., 300 Bway., Little Rock, automatic fire alarm sys., Arkansas Co., to American District Telegraph Co., 155 6 Ave., New York, N. Y., under **$50,000.**

†Arkansas — ELECTRIC DISTRIBUTION SYSTEM—U. S. Eng., Albuquerque, N. M., electric distr. sys., Coconino Co., to Vyne Bros. Electric Co., Inc., Prescott, Ariz. Under **$50,000.**

†California—CATWALKS, etc.—U. S. Eng., 751 S. Figueroa St., Los Angeles, catwalks, ladders and stairs, Los Angeles Co., to De Camp-Hudson Co., Ltd., 1277 W. 24 St., Los Angeles. Under **$50,000.**

†California—FLOODLIGHT SYSTEM, etc.—U. S. Eng., 1209 8 St., Sacramento, flood light system and service outlets, Sacramento Co., to C. L. Vining, Sacramento. Under **$50,000.**

†California—TAXIWAYS—U. S. Eng., 1209 8 St., Sacramento, taxiways, Merced Co., to Union Paving Co., 310 California St., San Francisco. **$100,000-$500,000.**

†California — TELEPHONE FACILITIES — U. S. Eng., 751 S. Figueroa St., Los Angeles, telephone facilities, Inyo Co., to Interstate Telegraph Co., Manzanar, under **$50,000.**

†California — POWER FACILITIES — U. S. Eng., 751 S. Figueroa St., Los Angeles, constructing changes and addns. to power distribution facilities, Riverside Co., to California Electric Power Co., Riverside. Under **$50,000.**

†California—SPUR—U. S. Eng., 751 S. Figueroa St., Los Angeles, railroad spur, No. 116, to Shannahan Bros. Inc., 6193 Maywood Ave., Huntington Park. Under **$50,000.** Bids 7/18.

†California—SURFACING—U. S. Eng., 751 S. Figueroa St., Los Angeles, surfacing, No. 134, to Harvey Adair Constr. Co., 1145 E. Garvey Ave., El Monte. Under **$50,000.**

★ **†California** — ENCASING PILES — U. S. Eng., 74 New Montgomery, San Francisco, encasing 1,000 timber piles with pneumatically projected concrete, to Emsco Concrete Cutting Corp., 147 11 St., San Francisco. Under **$50,000.**

†Connecticut—IMPROVEMENTS—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., imprvs., to E. Turgeon, 614 Turks Head Bldg., Providence, R. I. Bids 8/3.

California—CATWALKS, etc.—U. S. Eng., 751 S. Figueroa St., Los Angeles, catwalks and ladders, Los Angeles Co., to H. M. Keller Co., 4604 Hollywood Bldg., Los Angeles, under **$50,000.**

†California—ELECTRICAL SYSTEM—U. S. Eng., 751 S. Figueroa St., Los Angeles, electrical distr. sys. exten., Kern Co., to Electric & Machinery Service, 424 E. 3 St., Los Angeles, under **$50,000.**

†California—LIGHTS—U. S. Eng., 751 S. Figueroa St., Los Angeles, installing fluorescent lights, Riverside Co., to Clay Barton, Whittier, under **$50,000.**

†California—TOWERS—U. S. Eng., 751 S. Figueroa St., Los Angeles, wooden towers, Santa Barbara Co., to Hastings-Quinn, Inc., 1135 No. Las Palmas Ave., Los Angeles, under **$50,000.**

†California — LIGHTING SYSTEM — U. S. Eng., 751 S. Figueroa St., Los Angeles, lighting system, Orange Co., to Leo K. Allen, 1624 Cahuenga Blvd., Los Angeles. Less than **$50,000.**

†California — LINE EXTENSION — U. S. Eng., 751 S. Figueroa St., Los Angeles, line exten. and power service, Orange Co., to Southern California Edison Co., Ltd., 601 W. 5 St., Los Angeles, under **$50,000.**

†California—SPUR TRACK—U. S. Eng., 1209 8 St., Sacramento, spur track Sacramento Co., to J. R. Reeves, 12 St. and American River, Sacramento. Under **$50,000.**

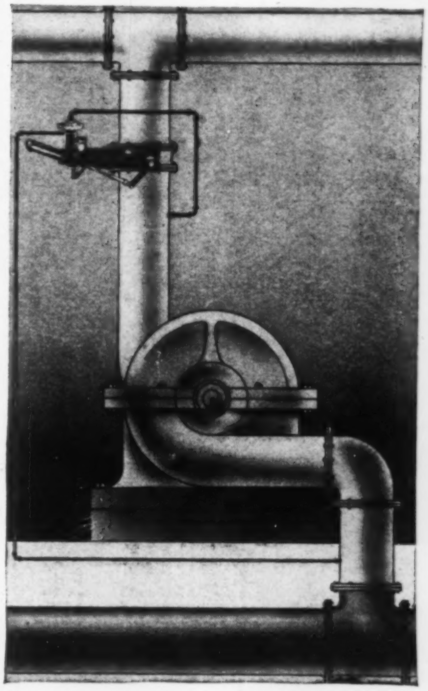
†California — LIGHTING SYSTEM — U. S. Eng., 74 New Montgomery St., Sacramento, Calif., lighting system, Kern Co., to Globe Electric Wks., 1899 Mission St., San Francisco. Under **$50,000.**

†California—RAILROAD SPUR—U. S. Eng., 751 Figueroa St., Los Angeles, railroad spur, Riverside Co., to Shannahan Bros., Inc., 6193 Maywood Ave., Huntington Park. **$50,000-$100,000.**

†Colorado — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., c/o Post Office, Denver, electrical distr. sys., Eagle Co., to Moore Electric Co., 727 W. 7 St., Los Angeles, Calif. Under **$50,000.**

†Colorado—GRADING—U. S. Eng., c/o Post Office, Denver, grading, Eagle Co., to Deakin Constr. Co., Denver. Under **$50,000.**

†Colorado—RELOCATING POWER LINE—U. S. Eng., c/o Post Office, Denver, relocating power line, Eagle Co., to Public Service Co. of Colorado, 15 and Champa Sts., Denver. Under **$50,000.**



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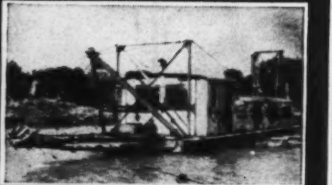

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UNCLASSIFIED (Contracts Awarded, Cont'd.)

†Florida — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, electrical distr. sys., Polk Co., to Lipscomb Electric Co., Lakeland, under **$50,000.**

†Florida — CONCRETE INSTRUMENT FOUNDATIONS—U. S. Eng., U. S. Courthouse & Customhouse, Mobile, Ala., concrete instrument fdns., Okaloosa Co., to [illegible] Bros. Constr. Co., Selma, Ala., under **$50,000.**

†Florida — COMPASS SWINGING BASE—U. S. Eng., U. S. Courthouse & Post Office Bldg., Jacksonville, compass swinging base, Orange Co., to Johnson & Mann, Walgren Bldg., St. Petersburg. Under **$50,000.**

†Florida—TARGET BUTT—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, target butt, Highlands Co., to Johnson & Mann, Walgren Bldg., St. Petersburg. Under **$50,000.**

†Georgia — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., Post Office Bldg., Savannah, electrical distr. sys. to H. B. Nelson Constr. Co., Red Rock Bldg., Atlanta, under **$50,000.**

★ **†Georgia**—ERECTION STEEL—U. S. Eng., 494 Spring St. N.W., Atlanta, erecting structural steel, Cobb Co., to Bethlehem Steel Co., Bethlehem, Pa., **$1,000,000-$5,000,000.**

Georgia and **Tennessee**—REPEATER STATIONS—American Telephone & Telegraph Co., Hurt Bldg., Atlanta, Ga., 6 repeater stations between Atlanta, Ga. and Chattanooga, Tenn., to Barrett Constr. Co., Dalton, Ga. CD 6/26—ENR 7/2.

†Georgia — NIGHT LIGHTING SYSTEM—U. S. Eng., Post Office Bldg., Savannah, night lighting sys., Dougherty Co., to H. B. Nelson Constr. Co., Red Rock Bldg., Atlanta, under **$50,000.**

★ **†Idaho**—APRONS, GUTTERS, etc.—U. S. Eng., Pittock Block, Portland, Ore., aprons, gutters, bituminous surfacing taxiways, runways and apron, Bannock Co., to Morrison-Knudsen Co., Inc., 319 Bway., and Triangle Constr. Co., 1707 Crescent Rim Dr., 123 Boise, **$500,000-$1,000,000.**

†Illinois—FOUNDATIONS, etc.—U. S. Eng., 520 Merchandise Mart, Chicago, concrete foundations, beams and girders, Cook Co., to Van Etten Bros. Builders Inc., 11024 S. Michigan St., Chicago, **$100,000-$500,000.**

†Kansas—GASOLINE FUELING SYSTEM—U. S. Eng., 416 Wright Bldg., Tulsa, Okla., gasoline fueling system, Montgomery Co. to Flotation Systems, Inc., 4031 Goodwin Ave., Los Angeles, Calif. **$50,000-$100,000.**

★ **†Kansas**—UNDERGROUND UTILITIES—U. S. Eng., 416 Wright Bldg., Tulsa, Okla., underground utilities, to B & M Constr. Corp., Petroleum Bldg., Oklahoma City, Okla. Total est. over **$3,000,000.** Bids July 6. CD 6/30.

†Kansas—RAILROAD SPUR—U. S. Eng., 10 E. 17 St., Kansas City, Mo., railroad spur, Saline Co., to M. W. Watson, Natl. Bank of Topeka Bldg., Topeka, **$100,000-$500,000.**

★ **†Kansas**—RUNWAYS, etc.—U. S. Eng., Albuquerque, N. M., runways, taxiways, hardstandings, Ford Co., to List & Clark Constr. Co., and San Ore Constr. Co., McPherson, Kan., **$1,000,000-$5,000,000.**

†Kansas—CLEARING—U. S. Eng., U. S. Courthouse & Customhouse, St. Louis, Mo., clearing for extension of runways, Leavenworth Co., to McDowell Stone Co. of Blackwater, Midland Bldg., Kansas City, Mo. **$50,000-$100,000.**

†Louisiana—SWITCH YARD—U. S. Eng., foot of Prytania St., New Orleans, switchyard, Inc. 43-41, to A. Farnell Blair, Decatur.

†Louisiana — ELECTRIC SUPPLY LINE—U. S. Eng., U. S. Post Office & Courthouse, Vicksburg, Miss., electric supply line, to Delta Constr. Co., Clarksdale, Miss.

†Louisiana—ELECTRICAL SUPPLY LINE—U. S. Eng., U. S. Post Office and Courthouse, Vicksburg, Miss., electrical supply line, Ouachita Co., to Delta Constr. Co., Clarksdale, Miss. Under **$50,000.**

†Maine—LIGHTING SYSTEM—U. S. Eng., 31 St. James Ave., Boston, Mass., lighting sys., Waldo Co., to Kenworthy & Taylor, Inc., Everett, Mass. Under **$50,000.**

†Maryland—BOILERS, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., installing boilers and accessories, to D. D. Condon Co., 1318 9 St. N.W., Washington, D. C., **$25,469.**

†Maryand—PLANTING, etc.—U. S. Eng., Standard Oil Bldg., Baltimore, planting and landscape work, to Towson Nurseries, Inc., Towson. **$50,000-$100,000.**

Massachusetts — IMPROVEMENT — Bethlehem-Hingham Shipyards, Inc., E. Howard St., Quincy, imprvts., to Blakeslee-Rolling Corp., 79 Cambridge St., Boston, Mass., **$50,231.**

Massachusetts — IMPROVEMENTS — Industrial Company, sheet metal plant, brick, to McCutcheon Co., 250 Stuart St., Boston. Est. **$40,000.** Bids 7/27. CD 7/24—ENR 7/30.

†Massachusetts—WHARF—U. S. Eng., Park Sq. Bldg., Boston, wharf exten., 175-43-NEG 24, to R. B. Rendle, 354 Border St., East Boston. Bids 8/4.

★ **†Michigan** — TUNNEL — U. S. Eng., 700 Union Guardian Bldg., Detroit, concrete tunnel, 5 shafts, to Great Lakes Dredge & Dock Co., 122 S. Michigan Ave., Chicago, Ill. Less than **$1,000,000.**

UNCLASSIFIED (Contracts Awarded, Cont'd.)

†Mississippi—OUTSIDE UTILITIES, etc.—U. S. Eng., U. S. Courthouse & Customhouse, outside utilities and fencing, Inv. 569-43-54, to Smith Pew Constr. Co., 2117 Piedmont Rd., N.E., Atlanta, Ga., **$100,000-$500,000.**

†Mississippi—RUNWAYS, etc.—U. S. Eng., U. S. Post Office & Courthouse, Vicksburg, bituminous concrete surfacing runways and taxiways, Hinds Co., to Mid South Paving Co., Jackson. Under **$50,000.**

†Montana — GASOLINE SYSTEM — U. S. Eng., Adminis. Bldg., Fort Peck, gasoline fueling and oil storage systems, Cascade Co., to Central California Constr. Co., Inc., 615 Burrows St., San Francisco, Calif. **$100,000-$500,000.**

†Montana — HYDRAULIC FUELING SYSTEM—U. S. Eng., Administration Bldg., Fort Peck, hydraulic fueling sys., to Aqua System, Inc., 385 Gerard Ave., New York, N. Y.

†Montana — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., Administration Bldg., Fort Peck, electrical distr. sys., Glacier Co., to Henry W. Miller Electric Co., Insurance Bldg. Annex, Omaha, Neb. Under **$50,000.**

†Montana — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., Administration Bldg., Fort Peck, electrical distr. sys., Fergus Co., to Henry W. Miller Electric Co., Insurance Bldg. Annex, Omaha, Neb. Under **$50,000.**

†Montana — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., Administration Bldg., Fort Peck, electrical distr. sys., Valley Co. to Henry W. Miller Electric Co., Insurance Bldg. Annex, Omaha, Neb. Under **$50,000.**

†Nebraska — GASOLINE STORAGE SYSTEM—U. S. Eng., 1709 Jackson St., Omaha, installing gasoline storage sys., Box Butte Co., to Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y., **$50,000-$100,000.**

†Nebraska—SPRINKLER SYSTEMS—U. S. Eng., 1709 Jackson St., Omaha, installing automatic sprinkler systems, Box Butte Co., to Walton Viking Co., Alliance, under **$50,000.**

†Nebraska—IMPROVEMENTS—U. S. Eng., 1709 Jackson St., Omaha, imprvs., to Olson-Assenmacher-Rokahr Constr. Co., Lincoln. Under $50,000.

†Nevada — IMPROVEMENTS — U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., imprvs. No. W-509-Eng. 3184, to Gibbons & Reid Co. and J. C. Compton Co., 259 W 3 St., S., Salt Lake City, Utah. Under **$50,000.**

†New Hampshire—CONCRETE WORK—U. S. Eng., Park Square Bldg., Boston, Mass., concrete work, facilities, 175-43-Neg 27, to John F. Griffin Co., 238 Main St., Cambridge, Mass. Under **$50,000.**

†New Jersey—ELECTRIC INSTALLATIONS, etc.—U S. Eng., 6 and Walnut Sts., Phila., Pa., electric installations and telephone distribution, Monmouth Co., to E. A. Kahn & Co., 163-18 Jamaica Ave., Jamaica, N. Y. **$50,000-$100,000.**

†New Jersey—RAILROAD CONNECTION—U. S. Eng., 120 Wall St., New York, N. Y., railroad connection facilities, Middlesex Co., to Reading Co., Reading Terminal, Phila., Pa. Under **$50,000.**

†New Jersey — RAILROAD FACILITIES RELOCATION—U. S. Eng., 120 Wall St., New York, N. Y., altering, constructing, relocating railroad facilities, Middlesex Co. to United New Jersey Railroad and Canal Co., Stelton. **$100,000-$500,000.**

†New Jersey—GRADING, etc.—U. S. Eng., 6 and Walnut Sts., Phila., Pa., grading, drainage and railway construction, Monmouth Co., to Brann & Stuart Co., Broad St. Sta. Bldg., Phila., Pa. Under **$50,000.**

†New Mexico—ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., Albuquerque, electrical distr. sys., San Miguel Co., to M. M. Sundt Constr. Co., Tucson, Ariz., under **$50,000.**

†New Mexico—SHELTERS—U. S. Eng., Albuquerque, concrete safety shelters, McKinley Co., to Denison, Martin & Cowart, Albuquerque. **$50,000-$100,000.**

†New Mexico—ELECTRIC DISTRIBUTING SYSTEM—U. S. Eng., Albuquerque, outdoor overhead electrical distr. sys. and facilities, to Purdy Electric Co., 215 N. Main St., Roswell. Under **$50,000.** CD 7/17—ENR 7/23.

†New Mexico—COMPASS SWINGING BASE—U. S. Eng., Albuquerque, compass swinging base, Otero Co., to Hiram Horn, Alamogordo, N. M. Under **$50,000.**

†New Mexico—ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., Albuquerque, electrical distr. sys., Santa Fe Co., to Prokosch Electric Co., Santa Fe, under **$50,000.**

†New Mexico—LIGHTING SYSTEM—U. S. Eng., Albuquerque, night lighting sys., Bernalillo Co., to Huning-Testman Electric Co., Inc., Albuquerque. Under **$50,000.**

†New York—GASOLINE DISTRIBUTION SYSTEM—U. S. Eng., Chimes Bldg., Syracuse, gasoline distr. sys., Onondaga Co., to R. T. Frye & Co., 623 10 Ave., New York. **$100,000-$500,000.**

★ **†New York**—TRACK SPUR—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., 30 mi. single track railroad, to S. A. Scullen, Cohoes. **$4,500,000.** National Lead Co. and Delaware & Hudson R.R., foot of State St., Albany, operators. CD 7/21—ENR 7/23.

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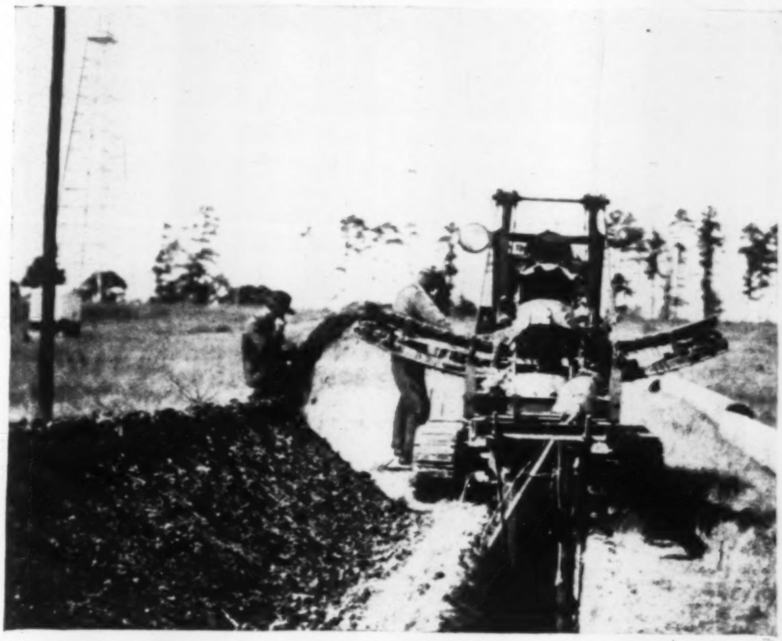

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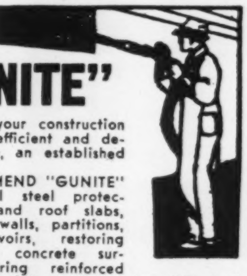

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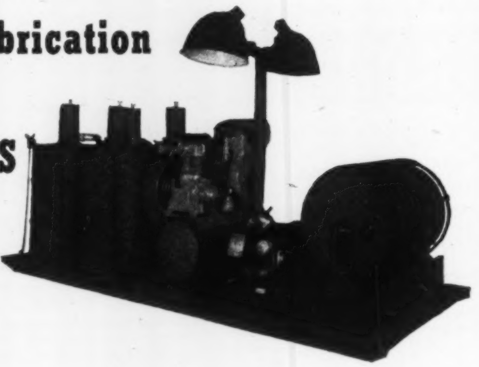

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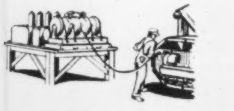

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UNCLASSIFIED (Contracts Awarded, Cont'd.)

†New York—FUELING SYSTEM—U. S. Eng., 960 Ellicott Sq. Bldg., Buffalo, addn. to hydraulic displacement gasoline fueling sys., Jefferson & Lewis Counties, to Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y. Under **$50,000.**

†Ohio—ELECTRICAL SYSTEM—U. S. Eng., 700 Union Guardian Bldg., Detroit, Mich., installing electrical sys., Cuyahoga Co., to Hatfield Electric Co., Keith Bldg., Cleveland. **$100,000-$500,000.**

†Ohio—PLUMBING, etc.—U. S. Eng., 700 Union Guardian Bldg., Detroit, Mich., plumbing, heating and air piping, Cuyahoga Co., to Gorman-Lavell Plumbing & Heating Co., 4408 Carnegie St., Cleveland. **$100,000-$500,000.**

†Ohio—AIRPORT—U. S. Eng., Wright Field, Dayton, concrete paving and placing tie down rings in apron, Greene Co., to Hinton & Smalley, Celina, O. **$50,000-$100,000.**

★ **†Ohio** — IMPROVEMENTS — Industrial Company, imprvs., to Lombardo Bros. Constr. Co., 1770 E. 11 St., Cleveland. **$2,300,000.** Defense Plant Corp. will finance. CD 7/29—ENR 8/6.

†Oklahoma—ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., 231 W. Main St., Denison, Tex., electrical distribution sys., Lamar Co., to F. H. Spaulding, 3018 Paseo St., Oklahoma City. under **$50,000.**

†Oklahoma — PROTECTION SYSTEM STANDPIPES, etc.—U. S. Eng., 416 Wright Bldg., Tulsa, fire protection sys. standpipes and sprinklers, Oklahoma Co., to Grinnell Co. Inc., 1315 Marilla St., Dallas. **$50,000-$100,000.**

†Oklahoma—ELECTRIC DISTRIBUTING SYSTEM—U. S. Eng., 416 Wright Bldg., Tulsa, electrical distr. sys., Mayes Co., to Mack Electric Co., Pryor. Under **$50,000.**

†Oregon—TAXIWAYS, etc.—U. S. Eng., 628 Pittock Blk., S.W., 10 Ave. and Washington St., Portland, taxiways, apron, drainage, underground ducts., Marion Co., to Natt McGougall Co., Sherlock Bldg., Portland. **$100,000-$500,000.**

†Oregon—SPRINKLER SYSTEM—U. S. Eng., Pittock Block, Portland, automatic sprinkler sys., Jackson Co., to Rushlight Automatic Sprinkler Co., 407 S.E. Morrison St., Portland. **$50,000-$100,000.**

†Pennsylyvania — STEEL STACKS — U. S. Eng., Chimes Bldg., Syracuse, N. Y., erecting steel stacks for boiler houses, Lycoming Co., to United Boiler Heating, Foundry Co., Hammond, Ind. Under **$50,000.**

†Tennessee — DISTRIBUTION SYSTEM — U. S. Eng., 306 U. S. Court House, Nashville, electrical distribution sys., Montgomery Co., to Harris McBurney Co., Clarksville, under **$50,000.**

★ **†Tennessee**—IMPROVEMENTS—U. S. Eng., P. O. Box 97, Memphis, improvements, Inv. 1092-42-13F, to Bowyer & Johnson, Jackson. Under **$1,000,000.**

†Texas — IMPROVEMENTS — U. S. Eng., Fort Sam Houston, imprvs., Spec. 42-214, to Kenan, Searles & Sullivan, Smith-Young Tower Bldg., San Antonio. $50,000-$100,000. Bids 7/25. CD 7/21.

†Texas—GASOLINE AND OIL STORAGE, etc.—U. S. Eng., San Antonio, gasoline and oil storage and dispensing sys., Hays Co. to J. P. Nash, Nash Bldg., Austin. **$100,000-$500,000.**

†Texas — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., San Antonio, electrical distr. sys., Bexar Co. to Taylor Constr. Co., Taylor. Under **$50,000.**

†Texas—SPRINKLER SYSTEM—U. S. Eng., 231 W. Main St., Denison, automatic sprinkler sys., Tarrant Co. to W. H. LaDew, 3010½ Hickory St., Dallas. Under **$50,000.**

†Texas—FIRE ALARM SYSTEM—U. S. Eng., 231 W. Main St., Denison, fire alarm sys., Tarrant Co. to American District Telegraph Co. of Texas, Interurban Bldg., Dallas. Under **$50,000.**

†Texas—RAILROAD SPUR—U. S. Eng., 231 W. Main St., Denison, addnl. railroad spur, to Missouri, Kansas Texas R. R. Co., Industrial Develop. Dpt., Katy Bldg., Dallas, under **$50,000.**

†Texas—AIR CONDITIONING SYSTEM—U. S. Eng., 231 W. Main St., Denison, air conditioning sys., Grayson Co., to Harris & Beeman, Inc., 509 E. 3 St., Fort Worth. Under **$50,000.**

†Texas — FIRE ALARM SYSTEM — U. S. Eng., 231 W. Main St., Denison, fire alarm sys., Lamar Co., to American District Telegraph Co. of Texas, Inc., 3500 Commerce St., Dallas. Under **$50,000.**

★ **†Texas**—GASOLINE FUELING SYSTEMS, etc.—U. S. Eng., 25 St. and Ave. F, Galveston, gasoline fueling sys., Victoria Co., to J. W. France Co., Corpus Christi, **$50,000-$100,000;** water storage and pump. sys., Victoria Co., to Layne-Texas Co., Ltd., 6931 Harrisburg Bldg., Houston, **$50,000-$100,000;** electric dis. and street lighting sys., etc., Victoria Co., to Roy White Electric Co., 905 Chartres St., Houston, **$50,000-$100,000;** gasoline fueling sys., Howard Co., to Nash Gasoline Co., Austin, **$50,000-$100,000;** temporary

UNCLASSIFIED (Contracts Awarded, Cont'd.)

frame bldgs., Victoria Co., to T. B. Hubbard Constr. Co., 1507 Delano St., and Russell W. Nix, 1507 Delano St., both Houston. **$1,000,000-$5,000,000.**

†Texas—IMPROVEMENTS—U. S. Eng., San Antonio, imprvs. hardstanding area and concrete paving, Palo Pinto Co. to Southern States Constr. Co., San Jacinto Life Bldg., Houston, under **$50,000.**

†Texas—RAILROAD SPUR—U. S. Eng., 25 St. and Avenue F, Galveston, construction, operation and maintenance of railroad spur, Concho Co., to Panhandle & Santa Fe R.R. Co., Amarillo. **$100,000-$500,000.**

†Texas—RAILROAD TRACKAGE—U. S. Eng., 231 W. Main St., Denison, railroad trackage, Tarrant Co., to Texas & Pacific Ry. Co., Texas & Pacific Bldg., Dallas, under **$50,000.**

★ **†Texas**—RUNWAYS, etc.—U. S. Eng., 25 St. and Avenue F, Galveston, runways, taxiways, concrete aprons, storm sewers, drainage, Travis Co., to Gulf Bitulithic Co. and Texas Bitulithic Co., 2820 Polk St., Houston. **$1,000,000-$5,000,000.**

★ **†Texas**—IMPROVEMENTS—U. S. Eng., Fort Sam Houston, imprvs., Spec. 42-187, to R. W. Briggs & Co., and E. B. Darby, Sunset Ro., San Antonio, **$1,200,000.** Bids 7/28. CD 7/24—ENR 7/16.

†Texas—GASOLINE FUELING SYSTEM—U. S. Eng., 25 St. and Ave. F, Galveston, gasoline fueling sys., Maverick Co., to Nash Gasoline Co., Austin. **$50,000-$100,000.**

†Texas—LIGHTING SYSTEM—U. S. Eng., 25 St. and Ave. F, Galveston, light lighting sys., McLennan Co., to F. B. Blank, Houston. Under **$50,000.**

†Texas — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., Fort Sam Houston, outdoor overhead electrical distr. sys., Spec. 42-216, to Allen Electric Co., 125 North St., San Antonio. Under **$50,000.** CD 7/22—ENR 7/30.

†Texas—CLEARING—U. S. Eng., San Antonio, clearing, blading, fence and roads, Quadalupe Co., to J. D. Scarborough, San Antonio. Under **$50,000.**

†Texas—CLEARING—U. S. Engineers, San Antonio, clearing, blading, Bexar Co., to O. L. Neyland, San Antonio, under **$50,000;** track siding, to W. A. Smith Constr. Co. and Martin & Grace, 331 Gregg Bldg., Houston, under **$50,000.**

†Texas — FIRE ALARM SYSTEM — U. S. Eng., 231 W. Main St., Denison, fire alarm sys., to American District Telegraph Co. of Texas, Interurban Bldg., Dallas. **$30,000.**

★ **†Texas** — IMPROVEMENTS — U. S. Eng., Fort Sam Houston, imprvs., Spec. 42-170, to Texas Bitulithic Co., 111 Commerce St., Dallas. Over **$1,000,000.** CD 7/28—ENR 7/30, under LB.

†Texas—OUTDOOR ELECTRICAL DISTRIBUTION SYSTEM, etc.—U. S. Eng., Fort Sam Houston, outdoor overhead electrical distr. sys., to Graham & Collins, 700 Avenue A, San Antonio, under **$50,000;** installing sanitary sewerage sys., to Engineering Contractors, Builders Exchange Bldg., San Antonio, under **$50,000,** both Spec. 42-218. Bids about 8/3.

Tex., Galveston—POWER CABLE—Houston Lighting & Power Co., c/o W. J. Aicklen, 2116 Church St., Galveston, installing 12,000 volt submarine power cable across Galveston channel, to Pelican Spit. Owner builds. **$60,000.**

Tex., Montague—OIL PIPELINE CARRIER—Sinclair Refining Co., Fair Bldg., Fort Worth, installing 17 mi. 4 in. welded joint, steel crude oil pipeline carrier. Force account. **$60,000.** CD 7/31—ENR 8/6.

†Utah—PILING—U. S. Eng., 32 Exchange Pl., Salt Lake City, furnishing and driving piling, Tooele Co., to James J. Burke & Co., Kearns Bldg., Salt Lake City. Under **$50,000.**

†Utah—RAMP—U. S. Eng., 32 Exchange Pl., Salt Lake City, timber ramp, Weber Co. to Wheelwright Constr. Co., 2434 Monroe Ave., Ogden. Under **$50,000.**

†Washington—ELECTRIC DISTRIBUTION SYSTEM—U. S. Eng., 800 3 Ave., Seattle, installing electrical distr. sys., King Co., to Holert's Electric Service, 2300 W. Spokane St., Seattle. Under **$50,000.**

†Wisconsin—ELECTRIC SYSTEM—U. S. Eng., 408 Federal Bldg., Milwaukee, inside electric sys., Dane Co., to O. T. Havey and D. B. A. Havey Electric Co., Madison. Under **$50,000.**

†Wisconsin — ELECTRIC WIRING — U. S. Eng., 408 Federal Bldg., Milwaukee, electric wiring, to Bradford Electric Co., Madison.

★ **†Wisconsin**—RUNWAYS, etc.—U. S. Eng., 520 Merchandise Mart, Chicago, Ill., runways, taxiways, Monroe Co., to L. G. Arnold, Inc., Box 192, Eau Claire, J. R. Griffith Co., Inc., 1500 9 St., Racine, and Thornton Constr. Co., Sparta. **$1,000,000-$5,000,000.**

N. B., St. John—WHARF—Dominion Govt., Ottawa, Ont., repairing ship wharf, to Ashley Colter Ltd., Woodstock Rd., Frederickton **$300,000.** K. M. Cameron, Dpt. Pub. Wks., Ottawa, Ont., engr. CD 3/3/41—ENR 3/6/41.

Que., Ancienne Loette—AIRPORT—Dpt. National Defense for Air, Ottawa, Ont., airport development, runways, taxi strip, to Atlas Constr. Co., Ltd., 679 Belmont St., Montreal. **$350,000.**

A speed-up tip to sand and gravel producers who use plain suction dredges

Are you operating a plain suction dredge that does not seem to deliver as much sand and gravel as it should? Your first thought might be that the dredging pump is at fault, and perhaps this may be the fact. The Morris engineers will be glad to check your operating conditions and give you authoritative advice on this point. However, here are two additional suggestions that may help.

If your deposit is compacted and will not cave readily, install a jet agitator at the suction intake supplied with water by a separate small centrifugal pump. In some cases, the installation of a jet agitator has increased output more than 100%.

If the material you handle includes a considerable proportion of heavy gravel, a cutter on the suction will provide greater regularity of feeding and prevent choking of the suction intake. Whatever your problem may be, the Morris engineers are prepared to give impartial advice based on more than 75 years of experience in the "hard to handle" centrifugal pump services.

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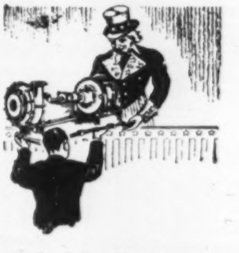

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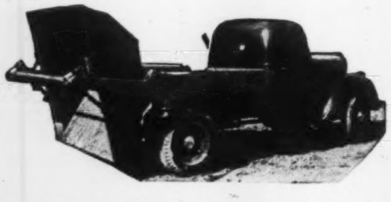

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LATIN AMERICA

★ **†Cuba** — Freeport Sulphur Co., through Necaro Nickel Co., 122 E. 42 St., New York, N. Y., plant to process low grade [illegible]. Own forces. **$20,000,000.** Defense Plant Corp. will finance. CD 3/25—ENR 4/2 under LA.

Mexico—Dpt. de S. P. Sonora, [illegible] Mexico, D. F., plans 200 bed hospital, Laguna Dist., Anna, Coahuila, $210,000; Port of Vera Cruz, Palacio Municipal, Vera Crus, L. Cerdan, mayor, plans municipal market and slaughter house, Vera Cruz, $315,000 loan obtained.

Mexico—Dpt. P. Works and Communications, Mexico City, miscellaneous frame buildings and utilities, for Air Corps Training Center; Dpt. P. Wks. and Communications, c/o E. Suarez, secy. of Finance, Mexico City, 1 and 2 story, frame bldgs., utilities for air corps training station, both in Mexico City area.

Mexico—Mexican Government, Mexico City, 8 mi. El Mirador Tunnel, 80 mi. southeast Mexico City, near Puebla, to Rosoff Constr. Co., 295 Madison Ave., New York, N. Y. 22,500,000 pesos. CD 7/30—ENR 8/6, under LB.

PUBLIC BUILDINGS

PROPOSED WORK

†Alabama—U. S. Eng., 494 Spring St. N.W., Atlanta, Ga., architect-engineer services, by Whitman, Requardt & Smith, W. Biddle & Chanles Sts., Baltimore, Md., addnl. frame bldgs., Madison Co.

★ **†Arizona**—U. S. Eng., **Albuquerque, N. M.**, buildings, **under $1,000,000.**

★ **†Arizona**—U. S. Eng., Albuquerque, N. M., additional buildings. $1,000,000-$5,000,000.

★ **†Calif., Palm Springs**—U. S. Eng., 751 S. Figueroa St., Los Angeles, addn. Torney General Hospital. Over $2,000,000.

†Del., Wilmington—Public Housing Auth., NHA, Temporary Bldg. No. 2, 19 and D Sts. N.W., Wash., D. C., 192 unit dormitory apartments, Del-7031; 200 unit dormitories, Del-7032(5).

†Florida—U. S. Eng., U. S. Courthouse and Post Office, Jacksonville, engineer-architect services, by Florida Associates, Starke, temporary frame bldgs., Lake Co.

†Florida—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, engineer-architect services, by Florida Associates, Starke, temporary frame bldgs., Pasco Co.

†Florida—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, engineer and architect services, by Smith & Gillespie, Realty Bldg., Jacksonville, temporary frame bldgs., Marion Co.

†Florida—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, engineer-architect services, by Smith & Gillespie, Realty Bldg., Jacksonville, temporary frame bldgs., Osceola Co.

†Florida—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, architect-engineer services by Maurice H. Connell and Assoc., Langford Bldg., Miami, temporary frame bldgs., Monroe Co.

†Florida—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, architect-engineer services by Reynolds, Brewton, Smith & Hills, Lynch Bldg., Jacksonville, temporary frame bldgs., Duval Co.

†Florida—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, plans by Bail, Hortvn & Associates, 409 W. Adams St., Jacksonville, temporary frame bldgs., Dade Co.

†Georgia—U. S. Eng., 33 Customhouse, Charleston, S. C., **soon takes bids**, building.

†Georgia—U. S. Eng., Post Office Bldg., Savannah, plans by C. Wm. Bergen, Liberty Bank & Trust Bldg., Savannah, temporary frame bldgs., Chatham Co.

Ga., Wellston—Wellston Housing Corp., c/o B. H. Butts, Jr., Thomaston, plans by Dennis & Dennis, Macon, archts., 200 residences.

†Ill., East St. Louis—Pub. Bldgs. Admin., 9 and D Sts. S.W., Wash., D. C., rejected bids June 24, painting exterior and interior of U. S. Post Office and Court House, Missouri Ave. at 8 St. Will readvertise. CD 6/19.

†Ill., Springfield—Decatur Public Housing Auth., NHA, 201 N. Wells St., Chicago, 650 temporary dormitory apartments, Ill-11172.

★ **†Iowa**—U. S. Eng., 1709 Jackson St., Omaha, Neb., expanding mfg. plant, Polk Co., exceeds $2,000,000.

★ **†Indiana**—U. S. Eng., Federal Bldg., Louisville, Ky., altering manufacturing plant, Marion Co. Over $3,000,000.

†Ind., Evansville—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., 450 dormitories.

★ **†Kansas**—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., plant. Over $3,000,000. Arthur G. McKee Co., 2300 Chester St., Cleveland, O., engrs.

PUBLIC BLDGS. (Proposed Work, Cont'd.)

†Kan., Parsons—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., 800 dormitories.

†Maine—U. S. Eng., 31 St. Jamese Ave., Boston, architect-engineer services, by Weston & Sampson, 14 Beacon St., Boston, Mass., temporary frame bldgs., facilities, Penobscot Co.

†Maryland—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., architect-engineer services, by J. E. Greiner Co., 1201 St. Paul St., Baltimore, temporary frame bldgs., Prince George Co.

†Maryland—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., architect-engineer services by Wiley & Wilson, consulting engineers, Lynchburg. Va., temporary frame bldgs., Washington Co.

†Massachusetts—U. S. Eng., 31 St. James Ave., Boston, plans by Putnam Cox & Saltonstall, 114 State St., Boston, bldg. Suffolk Co.

†Massachusetts—U. S. Eng., 31 St. James Ave., Boston, architect-engineer services by Leland & Larsen, 814 Statler Bldg., Boston, temporary frame bldgs., Middlesex Co.

†Michigan—U. S. Eng., 700 Union Guardian Bldg., Detroit. architect-engineer service, by Albert Kahn, Associates, Architects and Engineers, Inc., 345 New Center Bldg., Detroit, temporary frame bldgs., Macomb Co.

†Mississippi—U. S. Eng., Court House & Post Office, Vicksburg, plans by Chas. T. Main, Inc., 201 Devonshire St., Boston, Mass., temporary frame bldgs. CD 6/4—ENR 6/11.

★**†Missouri**—U. S. Eng., 10 E. 17 St., Kansas City, Mo., expanding mfg. plant, Jackson Co., exceeds $2,000,000.

★**†Minnesota**—U. S. Eng., U. S. Post Office & Customhouse, St. Paul, expanding mfg. plant, Ramsey Co., exceeds $4,000,000.

†Nebraska—U. S. Eng., 1709 Jackson St., Omaha, administration bldg. $50,000.

†Neb., Wahoo—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., 300 dormitories.

†New York—U. S.. Eng., 960 Ellicott Square Bldg., Buffalo, plans by Bley & Lyman, 505 Delaware St., Buffalo, temporary frame bldg., Erie Co.

†New York—U. S. Eng., Chimes Bldg., Syracuse, plans by Wm. S. Lozier, Inc., 10 Gibbs St., Rochester, temporary bldgs., Seneca Co.

O., Cleveland—Syndicate, c/o S. Galvin, Guardian Bldg., plans by G. Walters, 1836 Euclid Ave., seven 8 suite, brick veneer apartment bldgs. $250,000.

†O., Marion—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., 960 dormitories.

†Okla., Choteau—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., 3,680 dormitories.

†South Dakota—U. S. Eng., 1709 Jackson St., Omaha, Neb., plans by C. M. Stanley, Muscatine, Ia., temporary frame bldgs., Codington Co.

†Tennessee—U. S. Eng., Kingsport, plans by Fraser-Brace Engineering Co., Inc., 10 E. 40 St., New York, N. Y., concrete and brick buildings, Sullivan Co.

★**†Texas**—Public Housing Auth., Electric Bldg., Fort Worth, rejected bids July 31, houses, Tex. 41-131, sanitary sewerage sys., and water supply. Noted CD 8/4—ENR 7/9.

†Texas—U. S. Eng., Fort Sam Houston, buildings, Spec. 42-278. Plans $25 deposit.

†Texas—U. S. Eng., 25 St. and Avenue F, Galveston, plans by A. C. Finn, Bankers Mortgage Bldg., R. C. Stokes, 2616 Pittsburg St., R. F. Taylor, Bankers Mortgage Bldg., and H. U. Bible, Bankers Mortgage Bldg., all Houston, temporary frame bldgs., Webb Co.

†Texas—U. S. Eng., Fort Sam Houston, bldgs., Spec. 42-244. Plans $25 deposit.

†Texas—U. S. Eng., San Antonio, plans by C. T. Weidner and De Haven Pitts, Associate Architects, Alamo Natl. Bldg., and F. Drought, Frost Natl. Bldg., San Antonio, consulting engr., temporary frame bldg., Hays Co.

†Tex., Bastrop—At office Regional Engineer, Electric Bldg., Fort Worth, rejected bids 1 story, brick, concrete public health clinic, Tex. 41-466-F, for State Health Dpt., c/o Dr. G. W. Cox, dir., Austin. CD 7/14.

★**†Tex., El Paso**—U. S. Eng., Albuquerque, N. M., addn. William Beaumont General Hospital. Over $2,000,000.

†Texas, Fort Worth—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., 1,500 dormitories.

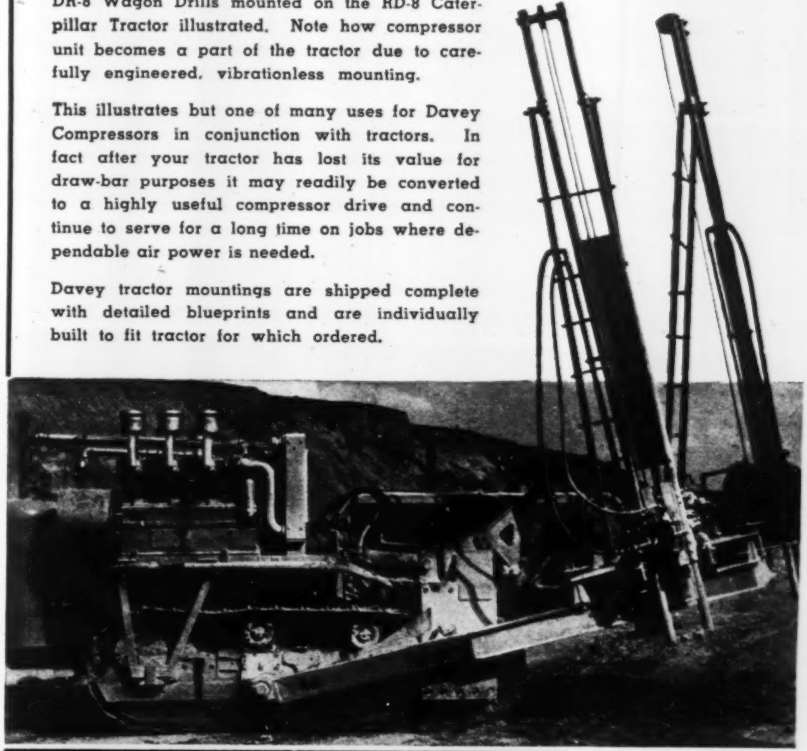
†Tex., Garland—Bd. Educ., E. D. Bussey, supt., plans by A. Hoke Smith, Inc., 2151 Fort Worth Ave., Dallas, school bldg., Tex. 41-551. FWA. $150,000.

†Tex., Karnack—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., 480 dormitories.

†Tex., Texarkana—U. S. Eng., 1 and Douglass Sts. N.W., Wash., D. C., 2,240 dormitories.

†Va., Geneva—U. S. Eng., 1 and Douglas Sts. N. W., Wash., D. C., 160 dormitories.

★**†Washington**—Public Housing Auth., NHA, Humboldt Bank Bldg., 785 Market St., San Francisco, Calif., 300 unit housing. $1,000,000.



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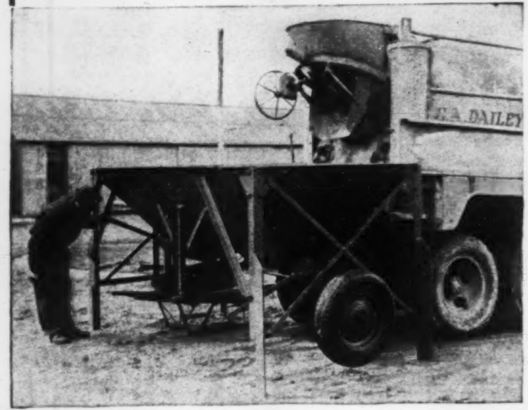

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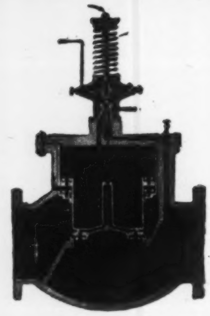

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PUBLIC BLDGS. (Proposed Work, Cont'd.)

★**Wash., Spokane**—Spokane Co., plans by Rigg & Van Peyton Bldg., hospital, $600,000. FWA funds sought. CD 2/2[illegible]—ENR 2/26.

★**†West Virginia**—U. S. Eng., Chesapeake & Ohio Bldg., Huntington, W. Va., mfg plant, Wetzel Co., exceeds $3,000,000.

†W. Va., Point Pleasant—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., [illegible] dormitories.

†Wisconsin—American Hydraulics Inc., [illegible] Forest St., Fond du Lac, plans by E. A. Stubenrauch, 708 Erie Ave., Sheboygan, 1 story, 52x60 ft., frame office building, concrete fdn. Defense Plant Corp. will finance.

†Wisconsin—Public Housing Auth., NHA, 201 N. Wells St., Chicago, Ill., plans by Foeller, Schober, Berners, Sofford & John, 310 Pine St., Green Bay, 500 unit housing project.

†Wis., Manitowoc—Public Housing Auth., NHA, 201 N. Wells St., Chicago, Ill., 250 temporary row houses, Wisc-47012.

†Alaska—Public Housing Auth., NHA, Temporary Bldg. No. 2, 19 and D Sts. N.W., Wash., D. C., 40 unit permanent housing Alaska-50013 at Anchorage, 15 unit permanent housing Alaska 50051 at Fairbanks.

†Pacific Northwest — U. S. Eng., Textile Tower, Seattle, bldgs. and yard; bldgs; storage facilities; oil lubrication sys.

N. B., St. John—Secretary Natl. Harbor Bd., West Block, Ottawa, Ont., rein.-con. transit shed 8 and annex. $300,000.

Ont., Ottawa—Secretary Dpt. Pub. Wks., Ottawa, bids soon, 2 story hostel Sussex St., $250,000; hostel at Experimental Farm, Carling Ave., $250,000; hostel west of temporary office bldg 8, Wellington St., $250,000. C. D. Sutherland, c/o owner, archt.

Ont., Ottawa—Secretary Dpt. Pub. Wks., Ottawa, bids soon, temporary office bldg., Wellington, Lyon, Bay and Sparks Sts. $400,000. C. D. Sutherland, c/o owner, archt.

Que., Limoilou (Postal Dist. Quebec City)—Wartime Housing Ltd., 55 York St., Toronto, Ont., 50 single family dwellings. $150,000.

Que., Longueuil—Secretary Dpt. Munitions & Supply, Ottawa, Ont., bids soon, addnl. extens. to aircraft mfg. plant. $100,000. T. Pringle & Son Ltd., 485 McGill St., Montreal, engrs.

BIDS ASKED

Bids Asked August 21

†Pa., Pittsburgh—Public Housing Auth., 270 Bway., New York, N. Y., 400 unit permanent housing, PA-36104. Smart & Cravotta, 3418 Delaware Ave., Pittsburgh, archts.

Bids Asked August 24

†Pennsylvania—Allegheny County Housing Auth., F. L. Palmer, exec. dir., 201 County Office Bldg., Pittsburgh, 100 unit housing project, Pa. 36105, for NHA. Extended date. P. T. Farrell, 309 4 St., Pittsburgh, archt. CD 8/3—ENR 8/6, under BA.

Bids Asked August 25

†Pa. — Mechanicsburg (Harrisburg)—Public Housing Auth., 270 Bway., New York, N. Y., 75 unit permanent housing PA-36085. W. L. Murray, Harrisburgh, archt. CD 7/21.

Bids Asked September 24

†Pennsylvania—Public Housing Auth., NHA, 270 Bway., New York, N. Y., 200 unit housing, Pa. 36258, Silverman & Levy, Architects Bldg., 17 and Sansom Sts., Phila., archts. Extended date. CD 7/21—ENR 7/23, under BA.

★**†New Mexico**—U. S. Eng., Albuquerque, building. $550,000. Meem, Zehner & Associates, Camino Del Monte Sol, Santa Fe, archts. Plans $50 deposit.

†Pacific Northwest — U. S. Eng., Textile Tower, Seattle, Wash., houses.

LOW BIDDERS

†Alabama—U. S. Eng., Huntsville, July 31, buildings from Chambers Lumber Co., Athens. **$100,000-$500,000.**

★**†California**—U. S. Eng., Wright Bldg., Sacramento, Aug. 4, **housing**, utilities, Spec. 126, from Standard Building Co., 1500 Judah St., San Francisco. **$500,000-$1,000,000.** Bids 8/4.

†Maryland—U. S. Eng., Standard Oil Bldg., Baltimore, July 31, X-ray instrument building, from John K. Ruff Co., 100 W. 22 St., Baltimore.

†New York—U. S. Eng., 120 Wall St., New York, Aug. 4, manufacturing building from J. P. Sewell Co., 372 Hudson Ave., Albany.

†Texas—U. S. Eng., Fort Sam Houston, July 28, Group D buildings, from McGough Bros., 610 Bankers Mortgage Bldg., Houston. **$100,000-$500,000.**

†Texas—U. S. Eng., Fort Sam Houston, buildings, Spec. 42-246 (T1-13), from Jim Handley, Inc., 516 Milby St., Houston. CD 7/30—ENR 8/6.

★**†Texas**—U. S. Eng., 25 St. and Avenue F, Galveston, July 28, from J. D. Townsend, Rte. 12, Box 178, Houston, Group A bldgs., **$1,000,000-$5,000,000*****from T. B. Hubbard Constr. Co., 1507 Delano St., Houston, Group

PUBLIC BLDGS. (Low Bidders, Cont'd.)

B bldgs. **$100,000-$500,000**; group C bldgs. **$100,000-$500,000*****from Aqua Systems, Inc., 3611 Perry St., Dallas, air corps gasoline and fuel sys. **$50,000-$100,000*****from McGough Bros., 603 Bankers Mortgage Bldg., installing sanitary sewerage system **$100,000-$500,000**; natural gas distr. sys. **$50,009-$100,000**, water system **$100,000-$500,000*****from Gayle Bros., Blodgett St., Houston, outdoor overhead electric distribution system, **$50,000-$100,000.**

†Texas—U. S. Eng., Fort Sam Houston, July 28, twenty-six 1 and 2 story, bldgs., Spec. 42-219, from G. W. Farrington, Houston, $190,000. CD 7/24—ENR 7/30.

†Tex., Orange—At office Regional Engineer, FWA Electric Bldg., Fort Worth, hospital, Tex. 41-383-F, for City, from A. Sargl, Beaumont, **$221,630.**. FWA. A. Sokolski, mayor.

†Tex., Palacios — Palacios Independent School Dist., July 28, elementary school and mechanical shop, from J. A. Roberts and O. L. Allen, 2006 Wheeler St., Houston. $232,222. **FWA.**

CONTRACTS AWARDED

★ **†Alabama—U. S. Eng., U. S. Courthouse & Customhouse, Mobile, temporary frame** bldgs., Jefferson Co., to N. C. Morgan Constr. Co., Tuscaloosa. **$500,000-$1,000,000.**

†Arkansas—U. S. Eng., 300 Bway., Little Rock, temporary frame bldgs., appurtenances, Sebastian Co., to Manhattan Constr. Co., Muskogee, Okla. and S. E. Evans Constr. Co., 2914 N. O St., Fort Smith. **$100,000-$500,000.**

†California—U. S. Eng., 751 S. Figueroa St., Los Angeles, 90 buildings, No. 143, to Griffith Co., 502 Los Angeles Railway Bldg., Los Angeles. **$100,000-$500,000.**

★ **†California**—U. S. Eng., 751 S. Figueroa St., Los Angeles, temporary frame bldgs., and railroad spur, to Jackson Bros.-Lee Sage, 547 S. Fairfax Ave., Los Angeles, **$500,000-$1,000,000*****temporary frame buildings and railroad spur, to Harvey A. Nichols, Brooklyn Ave. & N. Fettrly St., Los Angeles, **$1,000,000-$5,000,000*****temporary frame bldgs. and railroad spur, to Gorelnik Co., 3145 W. 8 St., Los Angeles, **$1,000,000-$5,000,000.** All Santa Barbara Co.

★ **†California** — U. S. Engineer, 751 So. Figueroa St., Los Angeles, temporary frame buildings, Riverside Co. to Griffith Co., Los Angeles R.R. Bldg., Los Angeles, **$1,000,000-$5,000,000*****elec. distr. sys. to H. C. Warren, Riverside, est. **$100,000.**

†California—U. S. Eng., 74 New Montgomery St., San Francisco, shop, to Alameda Co. Swanstrom & Stahl, 1615 78 St., Oakland. **$100,000-$500,000.**

★ **†California** — U. S. Eng., 74 New Montgomery St., San Francisco, building, San Luis Obispo Co., to H. C. Geyer, 787 Munras Ave., Monterey. **$100,000-$500,000.**

†California—Industrial Company, addn. to administration building, to M. J. King, 231 Franklin St., San Francisco. Bids 6/18. Federally financed.

†California—Housing Authority of City of Richmond, H. A. Barbour, exec. dir., 271 10 St., Richmond, administration building, emergency hospital unit, and cafeteria, to O. M. Rousseau, 321 Kearny St., San Francisco. C. I. Warnecke, Financial Center Bldg., Oakland and A. F. Roller, 1st Natl. Bank Bldg., San Francisco, archts.

★ **†California**—U. S. Eng., 74 New Montgomery St., San Francisco, telephone operator's quarters, to V. H. Moore, 157 Lorimer St., Salinas, under **$1,000,000.**

†Colorado—U. S. Eng., Albuquerque, N. M., temporary frame buildings, Prowers Co., to Lambie, Moss, Litle and James, Amarillo, Tex. **$100,000-$500,000.**

†Colorado—U. S. Eng., c/o Post Office, Denver, addn. and alteration to power house, to N. R. Nielsen, Denver. **$40,000-$100,000.**

★ **†Colorado**—U. S. Eng., c/o Post Office, Denver, temporary buildings, to Stull Constr. Co., Glenwood Springs. **$500,000-$1,000,000.**

†Connecticut—Industrial Company, brick, steel plant expansion, to Otto F. Burghart, Inc., 155 Island Brook Ave., Bridgeport. **$50,000-$100,000.** Federally financed. CD 7/22—ENR 7/30.

†Connecticut—U. S. Eng., 819 Industrial Trust Bldg., Providence, buildings, to O. Ahlborg & Sons, Inc., 97 Friendly Rd., Cranston, R. I.

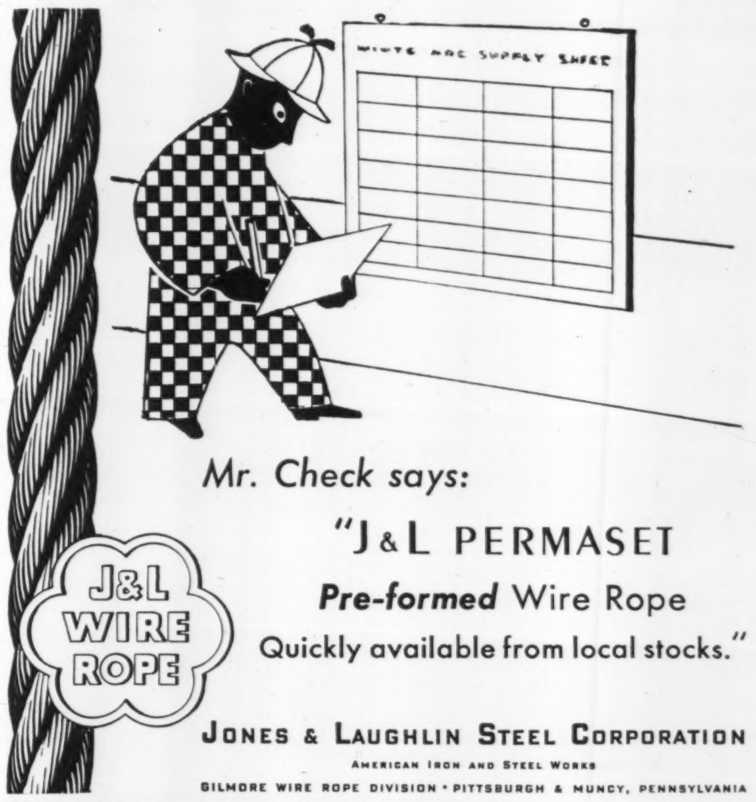
†Florida—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, temporary frame bldgs., Orange Co., to Johnson & Mann, Walgreen Bldg., St. Petersburg, under **$50,000.**

†Florida—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, temporary frame bldgs., Lee Co., to Means Constr. Co., Duval Bldg., Jacksonville. **$100,000-$500,000.**

†Florida—U. S. Eng., Courthouse and Custom House, Mobile, Ala., temporary frame bldg., Okaloosa Co., to A. Blair, Montgomery, Ala. **$500,000-$1,000,000.**

†Florida—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, concrete and steel storage facilities, Orange Co., to Stevens & Sipple, Orlando. Under **$50,000.**

†Georgia—U. S. Eng., 494 Spring St. N.W., Atlanta, temporary frame bldgs., Calhoun Co., to J. B. Perusini Constr. Co., Martin Bldg., Birmingham, Ala. **$100,000-$500,000.**



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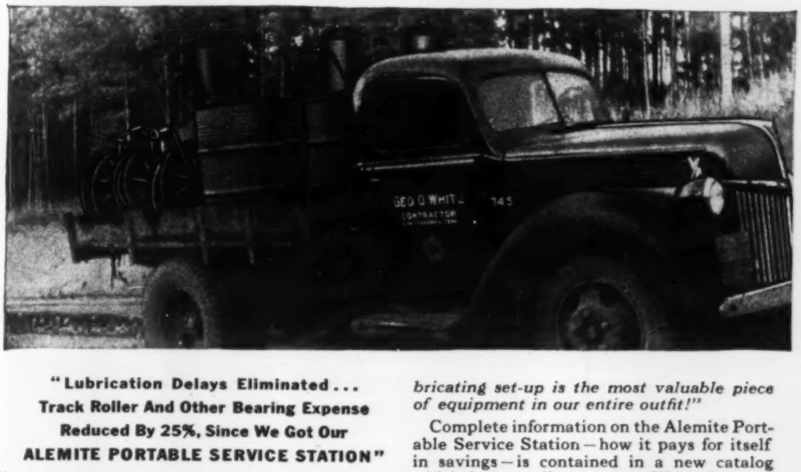

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PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

†Georgia—U. S. Eng., 494 Spring St. N.W., Atlanta, 3 bldgs., to G. Beers, Red Rock Bldg., Atlanta.

†Georgia—U. S. Eng., 494 Spring St. N.W., Atlanta, temporary frame buildings, Fulton Co., to Hallman Bros., 625 Spring St. N.W., Atlanta. **$100,000-$500,000.**

★ **†Georgia**—U. S. Eng., Bellcraft, superstructure for plant, to McDougald Const. Co., Hemphill Ave. N.W., Atlanta. Industrial Company will operate. Total cost **$30,000,000.** CD 6/22—ENR 6/25.

★ **†Illinois**—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., plant, to Norris Constr. Co., 59 E. Van Buren St., Chicago. **$1,000,000-$5,000,000.** Industrial Company will operate. Schmidt, Garden & Erikson, 104 S. Michigan Ave., Chicago, archts. H. J. Maveety, 53 W. Jackson Blvd., Chicago, structural engr.

†Illinois—U. S. Eng., U. S. Courthouse & Customhouse, St. Louis, Mo., temporary frame bldgs., Macon Co., to Henry Bros. Co., 228 N. La Salle St., Chicago. **$100,000-$500,000.**

★ **†Illinois**—U. S. Eng., U. S. Courthouse & Customhouse, St. Louis, Mo., carpentry and millwork, Macon Co., to John Felmley Co., Bloomington. **$500,000-$1,000,000.**

†Indiana—U. S. Eng., 700 Union Guardian Bldg., Detroit, Mich., temporary frame bldgs., Allen Co., to M. J. C. Billingham, Inc., Kalamazoo, Mich., **$500,000-$1,000,000.**

†Iowa—U. S. Engr., 1709 Jackson St., Omaha, Neb., temporary frame bldgs., Woodbury Co., to Peter Kiewit Sons Co., 1024 Omaha Natl. Bank Bldg., Omaha, Neb. **$500,000-$1,000,000.**

†Kansas—U. S. Eng., 10 E. 17 St., Kansas City, Mo., temporary frame bldgs., Geary Co., to Green, Casson, Green & Rinner, Manhattan, **$50,000-$100,000.**

†Louisiana—U. S. Eng., foot Prytania St., New Orleans, temporary bldgs., Beauregard Parish, to R. Angelle, Breaux Bridge, **$100,000-$500,000.**

†Louisiana—U. S. Eng., foot Prytania St., New Orleans, storehouses, etc., Inv. 1096-43-38, to L. F. Favret, 937 Gravier St., New Orleans. Bids 8/3. CD 7/31.

†Louisiana—U. S. Eng., foot Prytania St., New Orleans, temporary frame bldgs., Rapides Parish, to Mid-State Constr. Co., Alexandria. **$100,000-$500,000.**

†Maine—U. S. Eng., Park Sq. Bldg., Boston, Mass., buildings, 175-43-NEG 25, to A. J. Rourke, 49 Fenwood Rd., Roxbury, Mass. Bids Asked July 31.

†Maryland—U. S. Eng., Standard Oil Bldg., Baltimore, 1 story, frame bldgs., to P. Cohen, 5318 Beaufort Ave., Baltimore. **$50,000-$100,000.**

†Maryland—U. S. Eng., Standard Oil Bldg., Baltimore, temporary bldgs., Baltimore Co., to Armiger Constr. Corp., 2127 Maryland Ave., Baltimore, **$100,000-$500,000.**

†Maryland—U. S. Eng., Standard Oil Bldg., Baltimore, bldgs. to Consolidated Engr. Co., 20 E. Franklin St., Baltimore.

†Maryland—U. S. Eng., Standard Oil Bldg., Baltimore, bldgs., automotive experimental test course, also plant safety measures. to Consolidated Engr. Co., 20 E. Franklin St., Baltimore. **$100,000-$500,000.**

†Maryland—U. S. Eng., Standard Oil Bldg., Baltimore, buildings, to G. F. Hazelwood, Cumberland.

★ **†Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, temporary buildings, to Gilbert Douglas Co., 439 Penobscot Bldg., Detroit. Less than **$1,000,000.**

★ **†Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, office, to Howard MacDonald, Sault Ste. Marie. Less than **$1,000,000.**

★ **†Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, buildings, Chippewa Co., to A. H. Proksh, Iron River. Less than **$1,000,000.**

†Mississippi—U. S. Eng., Court House and Custom House, temporary frame bldg. Forrest Co. to Capitol Bldg. Co., Jackson and Currie & Corley, Raleigh, Miss., **$100,000-$500,000.**

†Mississippi—U. S. Eng., Courthouse & Customhouse, Mobile, housing facilities, Inv. 569-43-48, to Newton & Glenn, Hattiesburg. **$500,000-$1,000,000.** Bids 8/1.

†Montana—U. S. Eng., Administration Bldg., Fort Peck, temporary frame bldgs., Valley Co., to McLaughlin Constr. Co., Livingston, **$100,000-$500,000.**

†Montana—U. S. Eng., Administration Bldg., Fort Peck, temporary frame bldgs., Fergus Co., to Askevoid & Ruud, Great Falls, **$100,000-$500,000.**

†Montana—U. S. Eng., Administration Bldg., Fort Peck, temporary frame bldgs., Glacier Co., to Askevold & Ruud, Great Falls, **$100,000-$500,000.**

†New Jersey—U. S. Eng., 5 and Walnut St., Philadelphia, Pa., temporary frame buildings, Monmouth Co., to S. J. Day Associates, Asbury Park, N. J., **$100,000-$500,000.**

†New Mexico—U. S. Eng., Albuquerque, 60 frame temporary bldgs., to W. E. Wirtz, 1521 Parker St., Amarillo, Tex. **$100,000-$500,000.**

†New York—U. S. Eng., 120 Wall St., New York, temporary frame bldgs., Orange Co., to Walter T. Murphy, Inc., 326 W. 27 St., New York, **$100,000-$500,000.**

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PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

†**North Carolina**—U. S. Eng., 308 Customhouse, Wilmington, conversion of tent frames into hutments, New Hanover Co., to L. J. Coleman, Wilmington. **$100,000-$500,000.**

†**North Carolina**—U. S. Eng., 415 P. O. and Court House Bldg., Norfolk, Va., temporary frame bldgs., to T. A. Loving & Co., Goldsboro. **$100,000-$500,000.**

†**North Carolina**—U. S. Eng., 308 Customhouse, Wilmington, temporary frame bldgs., New Hanover Co., to P. S. West Constr. Co., Inc., Statesville. **$100,000-$500,000.**

★†**Ohio**—U. S. Eng., 6 and Walnut Sts., Phila., Pa., temporary frame bldgs., Trumbull Co., to Leo Yassenoff, c/o The F & Y Bldg. Service, 4216 E. Broad St., Columbus, **$1,000,000-$5,000,000.**

†**Ohio**—U. S. Eng., 649 Federal Bldg., Detroit, Mich., concrete block bldgs., passageways, grease and wash racks, remodeling temporary frame bldgs., Ottawa Co., to Steinle-Wolfe, Inc., Fremont, O., 1515 Croghan St., Fremont, **$100,000-$500,000.**

†**Ohio**—Industrial Company, altering plant, to Rust Engineering Co., Clark Bldg., Pittsburgh, Pa. **Less than $500,000.** Federally **financed.**

†**Oklahoma** — U. S. Eng., 231 W. Main St., Denison, Tex., temporary frame bldgs., Comanche Co., to W. A. Zant, 3429 Dorothy Lane, S., and J. L. Green, 2531 Timberline Dr., both Fort Worth, Texas., **$100,000-$500,000.** CD 8/3—ENR 8/6.

★†**Pennsylvania**—Climax Molybdenum Corp., M. W. Murphy, supt., Langeloth, engineering and construction, management services, plant addn., to Rust Engineering Co., Clark Bldg., Pittsburgh, Pa. **$500,000.** Federally financed.

†**Pennsylvania**—U. S. Eng., 6 and Walnut Sts., Phila., concrete and steel bldgs., Lehigh Co., to H. E. Stoudt & Son, Inc. 5 and Susquehanna Sts., Allentown, **$100,000-$500,000.**

†**South Carolina**—U. S. Eng., 33 Customhouse, Charleston, temporary frame bldgs., Richland Co., to John C. Heslep Co., Carolina Bank Bldg., Columbia, **$100,000-$500,000.**

†**South Carolina**—U. S. Eng., 33 Customhouse, Charleston, filling in sunken portions of underdrains, Charleston Co., to R. B. Tyler Co., Inc., 1446 Levering St., Louisville, Ky. Under **$50,000.**

Tennessee—U. S. Eng., U. S. Courthouse & Customhouse, Mobile, Ala., temporary frame bldgs., Montgomery Co., to Gardner Constr. Co., McGavock Lane, Nashville, **$100,000-$500,000.**

†**Tennessee**—U. S. Eng., 494 Spring St. N.W., Atlanta, Ga., temporary frame bldgs., Gibson Co., to A. R. Abrams Constr. Co., 41 Exchange Pl. S.E., Atlanta, Ga., **$100,000-$500,000.**

★†**Tennessee**—U. S. Eng., P. O. Box 97, Memphis, buildings, Inv. No. 1092-42-15 F, to Mayfair Constr. Co., 3114 W. Devon St., Chicago, Ill. Under **$1,000,000.**

★†**Texas**—Public Housing Auth., NHA, Electric Bldg., Fort Worth, 300 unit demountable housing, Tex. 41145, to E. L. Bruce Co., Thomas St., Memphis, Tenn. **$790,000.** Bids 6/5. CD 5/26—ENR 5/28, under BA.

†**Texas**—U. S. Eng., Fort Sam Houston, buildings, to H. H. Moeller, 1211 Willow St., San Antonio. **$100,000-$500,000** additional to CA. CD 4/27—ENR 4/30.

★†**Texas**—U. S. Eng., San Antonio, temporary frame bldgs., Val Verde Co., to R. W. Briggs & Co. and E. B. Darby, Sunset Rd., San Antonio. **$1,000,000-$5,000,000.**

†**Texas**—U. S. Eng., San Antonio, temporary frame bldgs., Taylor Co., to Rose Constr. Co., Abilene. **$100,000-$500,000.**

★†**Texas**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave., N.W., Wash., D. C., facilities, NOY 5675, to Knutson Constr. Co., Union Natl. Bank Bldg., Houston. **$580,000.**

†**Texas**—U. S. Eng., Albuquerque, N. M., buildings, to R. E. McKee, 1918 Texas St., El Paso. **$100,000-$500,000.**

★†**Texas**—Industrial company, plant to Stone & Webster, Inc., 49 Federal St., Boston, Mass. **$18,000,000.** Federally financed. CD 7/30—ENR 8/6.

†**Texas**—U. S. Eng., San Antonio, temporary frame bldgs., Palo Pinto Co., to Allied Constr. Co., Dallas. **$100,000-$500,000.**

†**Texas**—U. S. Eng., 231 W. Main St., Denison, temporary frame bldgs., Bowie Co., to Munn Constr. Co., 5319 Junius St., Dallas. **$100,000-$500,000.**

★†**Utah**—U. S. Eng., 32 Exchange Pla., Salt Lake City, building ext. to Peter Kiewit Sons Co., Omaha Natl. Bank Bldg., Omaha, Neb. and Ford J. Twaits & Co., 151 N. Ave. 19, and Morrison-Knudsen Co., 411 W. 5 St., both Los Angeles, Calif. Over **$5,000,000.**

†**Utah**—U. S. Eng., 32 Exchange Pl., Salt Lake City, concrete, steel storage bldgs., Weber Co., to Chytraus Constr. Co., Salt Lake Airport, Salt Lake City, under **$50,000.**

†**Virginia**—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., temporary frame bldgs., Alexandria, to A. Lloyd Goode Contg. Co., 1427 I St. N.W., Wash., D. C. **$100,000-$500,000.**

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PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

†Washington—U. S. Eng., Textile Tower, Seattle, frame bldgs., to A. F. Mowat, 1331 3 Ave. Bldg., Seattle. **$100,000-$500,000.**

†Washington—U. S. Eng., 800 3 Ave., Seattle, temporary frame bldgs., King Co., to Sound Constr. & Engrg. Co., Northern Life Bldg., Seattle. **$100,000-$500,000.**

★**†Washington** — Vancouver Housing Auth., City Hall, Vancouver, 1,000 unit permanent housing to Teufel & Carlson, Skinner Bldg., Seattle, **$3,720,000.** Former contract rescinded. CD 6/10—ENR 6/18 under CA.

†Wisconsin—U. S. Eng., 408 Federal Bldg., Milwaukee, architect and engineering services, supervision of construction temporary frame bldgs., Milwaukee Co., to Consoer, Townsend & Quinlan, 211 N. Wacker Dr., Chicago, Ill.

★**Que., Montreal**—Defense Industries, Ltd. 1135 Beaver Hall Hill, various concrete, brick, wood bldgs., north of Cremazie Blvd., to Angus Robertson, Ltd., 660 St. Catharines St., W. Est. Incl. equip. **$5,000,000.** Dpt. Munitions & Supply, Ottawa, Ont., engrs. CD 4/7—ENR 4/9 under CA.

COMMERCIAL BUILDINGS

PROPOSED WORK

Calif., Richmond—Walker-Built Homes, Inc., 401 Spruce St., Berkeley, plans by P. Hammarberg, 2 Norwood Dr., Berkeley, 85 residences, Florida Ave., et. al. $340,000.

★**Mo., St. Louis**—American Society for Control of Diabetes, Inc., P. Van Cheek, pres., 619 Wainwright Bldg., hospital center, Kosciusko, Missouri, Osage and Gasconade Sts. $5,000,000.

N. C., Durham—Northwood Housing Corp., Durham, 17 brick apartment bldgs. $250,000.

O., Columbus—Herbst-Black Co., 2207 Lockbourne Rd., forty-four 1 story, frame dwellings, etc., 19 Ave., Mithoff, Hanford, 21, 22 and 23 Sts. $178,500.

Wash., Seattle—Balch & Setzer, E. 85 St. and 35 Ave. N.E., 90 houses. $360,000.

CONTRACTS AWARDED

California—Sunshine Building Co., 540 El Vamino Real, San Carlos, sixty-one 1 story frame residences, Willows Tract, San Mateo Co. Owner builds. Est. **$244,000.**

Calif., Concord—Billings & Renz, 1526 31 Ave., San Francisco, 100 residences, Concord Terrace. Owner builds. Est. **$400,000.** D. E. Jaekle, R.F.D. 1, Box 166 B, Los Altos, archt.

Calif., Lakewood Village (Sta. Long Beach)—Second Defense Housing Corp., one hundred frame and stucco dwellings, Mayfair Tract near Lakewood Village, to Geo. M. Holstein, Jr., 9437 Santa Monica Blvd., Beverly Hills, over **$200,000.**

Calif., Martinez—F. A. Andrews, 11 Home Pl. East, Oakland, fifty 1 story frame residences, to M. E. Valente, Lafayette, J. E. McDaniels, Walnut Creek and F. A. Andrews, 11 Home Place East, Oakland. Est. **$200,000.**

Calif., Marysville—W. D. Sales, 824 Chestnut St., Yuba City, 1 story frame residences, East Marysville Addn. Owner builds. Over **$150,000.**

★**Calif., Oakland**—J. Rogers, 10413 E. 14 St., Oakland, four hundred 1 story, frame residences, Brookfield Village. Owner builds. **$1,600,000.**

★**Calif., Oakland**—Stoneson Bros., 1 Sloat Blvd., San Francisco, one thousand 1 story frame residences, Brookfield Village. Owner builds. Est. **$4,000,000.** H. Stoner, 1 Sloat Blvd., San Francisco, archt.

Calif., Sunnyvale—Davis Bohannon 1182 Market St., San Francisco, addnl. fifty-five 1 story, frame residences. Owner builds. **$220,000.**

Calif., Willowbrook—McCarthy Co., 1138 S. Bway., Los Angeles, 110 frame, stucco residences, Willowbrook Dist., to J. L. Schimmer, Jr., Tower Bldg., Santa Monica, approx $275,000.

Ga., Brunswick—Home Building, Inc., c/o N. C. Franklin, pres., Brunswick, 83 residences, to J. C. Strother, St. Simon Island.

Ill., Chicago—T. J. Boyer, 8518 S. Ashland Ave., masonry contract five rows brick houses, to J. Vaci, 6854 S. Paulina St., fdn., to A. Dykstra, 1301 W. 73 St. Carpentry work by own forces. H. E. Anderson, 7915 S. State St., archt.

Kan., Kansas City—Charles V. Vawter Investment Co., 4220 W. Mission St., 85 residences, Johnson Co., near here, day labor. **$250,000.**

O., Columbus—University View Corp., 22 W. Gay St., 162 1½ story frame dwellings, Chambers Circle, Chambers and W. 8 Sts., Hess Blvd., Sells and Gerard Rds., Kenny Rd., to Ohio Victory Homes Corp., 22 W. Gay St., **$250,000.** Awarded 8/1.

South Carolina—Wilson Contg. Co., Riverland Golfview, Charleston, 1 story, 28x30 ft. asbestos siding residences. Owner builds. **$250,000.**

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COMMERCIAL BLDGS. (Contracts Awarded, Cont'd.)

Tex., Borger—Hycar Chemical Co., Bartlesville, Okla., frame dwellings, force account. $150,000. CD 5/28—ENR 6/4.

Tex., Wichita Falls—Sheppard Estates Addition, c/o F. Abel, 1211 20 St., 34 one story, dwellings, 30x36 ft., all utilities. Force account. $150,000. CD 7/30—ENR 8/6.

Wis., Milwaukee—St. Anthony Hospital, 1022 N. 10 St., 5 story, bsmnt., 42x91 ft. brick, steel hospital addn., concrete fdn., to H. Schmitt & Son, Inc., 930 E. Burleigh St. CD 3/10—ENR 3/12.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Connecticut—PLANT—Vought-Sikorsky Div. United Aircraft Corp. 550 Main St., Stratford, factory. Over $50,000.

Conn., Milford—FACTORY—Elliott Mfg. Co., 347 New Haven Ave., brick factory addn. $40,000.

La., New Orleans—POWER HOUSE—New Orleans Public Service, Inc., 317 Baronne St., power house addns., S. Peter, Orange, Market and Water Sts. $189,000. Ebasco Service Co., engrs.

New York—PLANT—Jamestown Aeronautical Corp., c/o F. C. Pickard, Jamestown Sterling Co., Allen St. Ext., Jamestown, plans by Beck & Tinkham, Bailey Bldg., Jamestown, 1 story, concrete frame, steel, plant. $25,000.

O., Bedford—PLANT—Jack & Heintz, Inc., H. E. Stremple, supf. of construction, Bedford, 1 story, 80x120 ft. brick, steel plant. **$50,000.** Wilbur Watson & Associates, 4614 Prospect Ave., Cleveland, engrs.

O., Cleveland—SHOPS—New York Central R. R., J. W. Pfau, ch. engr., 466 Lexington Ave., New York, N. Y., 1 story, concrete wheel regrinder bldg., 1 story, 28x40 ft. machine shop. $40,000.

Pa., Wilkes-Barre — PLANT—Wilkes-Barre Carriage Co., Horton and S. Franklin Sts., 1 story, 30x82 ft. plant addn. $40,000.

R. I., Providence—GARAGE—Rhode Island Bus Co., 400 Fountain St., plans by E. E. Cull, 58 Weybosset St., brick, steel bus terminal garage. $40,000.

R. I., Providence—GARAGE—Rhode Island Bus Co., 400 Fountain St., soon lets contract, 1 story, 65x100 ft. brick steel bus terminal garage. $40,000. E. E. Cull, 58 Weynosset St., archt. CD 8/6—ENR 8/10.

Tex., Brownsville—TERMINAL STATION—Union Bus Lines, 808 Navarro St. and J. Amberson, 411 Dunning St., San Antonio, concrete, brick, hollow tile, stucco bus terminal station bldg.

Alta., Edmonton — PLANT — Consolidated Fruit Co., Ltd., 24 Michael Bldg., Calgary, bids soon, rebuilding plant. $51,754.

Alta., Grande Prairie—POWER PLANT—Canadian Utilities Ltd., 215 6 Ave., Calgary, exten. power plant. $50,000.

B. C., Mission—PLANT—Boronky & Gree c/o Bd. Trade, textile plant. $40,000.

B. C., North Vancouver—PLANT—L' Aire Liquide Society, 111 Beaver Hall Hill, Montreal, Que., bids soon, plant, also pipe line to 2 ship yards. $127,000.

B. C., Vancouver—MACHINE SHOP—Vivian Engine Wks., Ltd., 1100 W. 6 St., bids soon 33x125x250 ft. concrete machine shop. $150,000.

Man., Flin Flon—MILL—Emergency Metals, Ltd., Royal Bank Bldg., Winnipeg, bids soon, head frame and ore bin, 60 ft. high, wood; 30x80x164 ft. mill bldg. and crusher 2½ mi. road, 5 mi. south of here. $320,280.

Ont., Hamilton—PLANT—W. F. Fearman Co., Ltd., 226 Rebecca St., bids soon, cold storage plant. $45,000.

Ont., Peterborough—PLANT—Dewart Milling Co., Ltd., c/o T. J. Carley, K. C., Peterborough, milling and feed plant. $40,000.

Ont., St. Isidore de Prescott — MILL — Cooperative de line de St. Isidore, St. Isidore de Prescott, flax mill $40,000. Engineer, c/o J. E. Maframboise, St. Isidore de Prescott.

Ont., Toronto—PROCESSING—Canada Packers, Ltd., St. Clair Ave. W., bids soon 4 story, processing plant. $100,000.

Ont., Windsor—PLANT—Universal Sheet Metals, Ltd., Windsor, plant. $40,000.

Que., Montreal — MILL — Sherwin-Williams Co. of Canada, Ltd., 2875 Center St., bids soon, reconstructing plant, St. Patrick St. near Atwater St. $50,000.

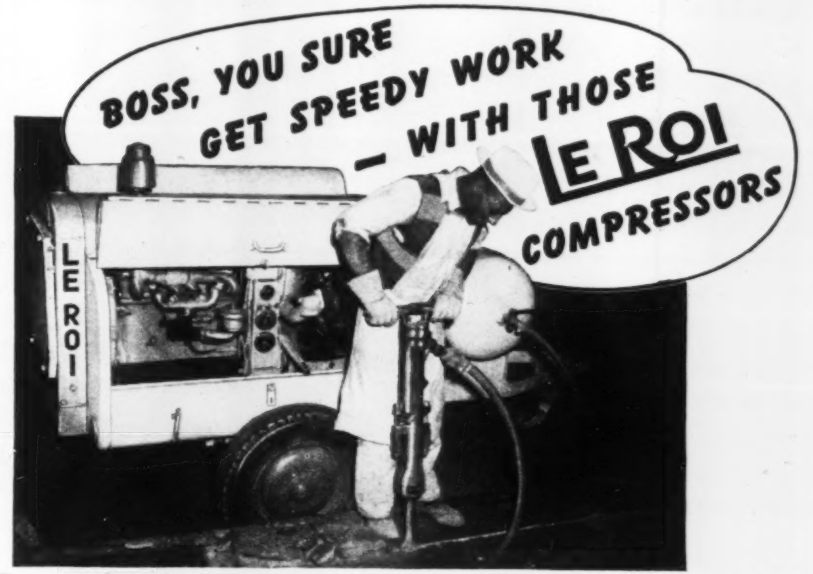
Que., St. Jean des Piles—PLANT—Cadorette Canoe Co., St. Jean des Piles, woodworking plant. $40,000. Architect c/o P. Cadorette, St. Jean des Piles.

Que., Senneterre—PLANT—Syndicate c/o J. Bilodeau, mayor of Senneterre, pulp and paper plant. $200,000.

BIDS ASKED

Bids Asked August 18

Conn., Bridgeport — TRUCK GARAGE — Fletcher-Thompson, Inc., Fairfield Ave., 1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INDUSTRIAL BLDGS. (Bids Asked, Cont'd.)

story, 25x250 ft. 45x70 ft. and 45x55 ft. brick concrete truck garage, Cherry St., for McLean Trucking Co., Inc., 350 Cherry St. $45,000.

Bids Asked

Pa., Phila.—FREIGHT HOUSES, etc.—Reading Co., A. E. Owen, ch. engr., Reading Terminal, 12 and Market Sts., repairing 5 freight houses and oil house, vicinity Front and Noble Sts.

Que., Quebec City—PLANT—Dominion Oxygen Co., Ltd., 159 Bay St., Toronto, Ont., oxygen plant, acetylene and carbide warehouse. $165,739 incl. equip.

CONTRACTS AWARDED

Ark., Lake Catharine — SUBSTATION — Louisiana Electric Cooperative, Fort Smith, substation, to L. O. Brayton, Dyersburg, Tenn. Est. $50,000.

Connecticut—PLANT—Industrial Company, 1 story, 300x300 ft., factory and 2 story, 60x240 ft. office to E & F Constr. Co., 94 Wells St., Bridgeport. Over **$40,000.** CD 7/22—ENR 7/30 under BA.

Conn., Glenbrook (sta. Stamford) — FACTORY—Laminated Shim Co., Inc., C. N. Aborn, pres., Union St., brick factory addn., to Vuono Constr. Co., 217 Bedford St., Stamford. Est. **$40,000.** CD 7/24—ENR 8/6.

Ill., Rockford—FACTORY—Twin Disc Clutch Co., 1328 Racine St., Racine, Wis., factory, to Johnson & Hendrickson, 422 Dodge St., Racine, Wis. Est. incl. equip. **$40,000.** F. J. Hoffman, 201-6 St., Racine, Wis., archt.

Ind., Indianapolis—FACTORY—R.C.A. Mfg. Co., 201 N. Front St., Camden, N. J., design and construction, 1 story, 112x500 ft. concrete block, steel, wood factory, to H. K. Ferguson Co., Hanna Bldg., Cleveland, O. Est. **$500,000.**

Kan., Clay Center—ELEVATOR—Marshall Feed Co., P. Marshall, pres., 100x150 ft. grain elevator, day labor. Est. **$45,000.**

La., Evangeline — PLANT — Evangeline Pepper & Food Products Co., Opelousas, sweet potato pepper and vegetable dehydrated plant. Force account. **$40,000.** CD 7/15—ENR 8/6.

La., Evangeline—PLANT—Paprika Co. Inc., Opelousas, sweet potato and vegetable dehydrated plant. Force account. **$48,000.** CD 7/15—ENR 8/6.

La., St. Francisville—PLANT—Warriner Starch Plant, c/o D. Warriner, St. Francisville, sweet potato dehydrated plant. Force account. **$40,000.** CD 7/14—ENR 7/16.

Md., Sparrows Point (br Baltimore)—TOOL SHOP—Bethlehem Steel Co., Bethlehem, Pa., tool shop, to Consolidated Eng. Co., 20 E. Franklin St., Baltimore. CD 7/29—ENR 8/6.

Mass., Quincy — WAREHOUSE—Bethlenem Steel Co., E. Howard St., 1 story, 103x328 ft. brick warehouse No. 10, with 20x65 lean-to, Fore River, to F. Leroy Fox, Inc., 101 Milk St., Boston. **$116,796.** Bids 7/27. CD 7/23—ENR 7/30.

Mass., Salem—FACTORY—Atwood & Morill, 48 Loring Ave., 1 story, brick factory, Loring Ave., to Walsh Constr. Co., 119 Webb St. Est. **$40,000.** Bids 7/30. CD 7/23—ENR 7/30.

Neb., Fremont—GRAIN ELEVATOR—N. B. Updike, Grain Exch. Bldg., Omaha, corrugated steel grain elevator, day labor. Est **$100,000.** CD 7/22—ENR 8/6.

N. Y., Jamestown—PLANT—J. P. Danielson Co., Inc., 583 Allen St., 1 story, 50x300 ft. brick, steel concrete plant addn., to L. H. Ludwig Co., 20 W. Main St., Falconer. Est. incl. equip. **$45,000.**

O., Cleveland — BOILER HOUSE — Harris-Seybold & Potter Co., c/o A. S. Harris, 4500 E. 71 St., boiler house, radial brick stack, to Gillmore-Carmichael-Olson Co., 1873 E. 55 St. Est. **$40,000.**

O., Cleveland—MACHINE SHOP—Plating & Galvanizing Co., T. E. Round, vice pres., Garfield Blvd., 1 story, 50x200 ft. brick, steel machine shop addn., to E. J. Bennes Co., Terminal Tower. **Est. $50,000.** L. L. Broida, 1643 Lee Rd., archt.

O., Euclid (br. Cleveland) — MACHINE SHOP—Chase Brass & Copper Co., W. L. Smith, supt., 1155 Babbitt Rd., Cleveland, design and construction 1 story, 120x250 ft. brick, steel machine shop addn., to Stone & Webster Eng. Corp., 1155 Babbitt Rd. **$180,000.**

O., Geneva—FACTORY—American Fork & Hoe Co., R. H. Cowdery, Genl. Mgr., Geneva, 1 story, 26x90 ft. and 75x75 ft. brick, steel factory addns., to Alger-Rau, Inc., 12434 Cedar Rd., Cleveland. Est. **$60,000.** Chas Bacon Rowley & Associates, Keith Bldg., Cleveland, engrs.

Pa., Corapolis—FACTORY—Continental Roll & Steel Fdry Co., 144 and R. R. Sts., East Chicago, Ind., altering 3 story, 30x120 ft. and 2 story, 30x60 ft. factory, to Geo. H. Seaman Co., 6388 Penn Ave., Pittsburgh. CD 7/27—ENR 7/30.

Pa., Newell—PLANT—General Chemical Co., 40 Rector St., New York, N. Y., brick plant, to W. E. Wood Co., 4649 Humboldt St., Detroit, Mich.

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INDUSTRIAL BLDGS. (Contracts Awarded, Cont'd)

R. I., Providence—FREIGHT TERMINAL—Southern New England Terminal, Okie St., 1 story, 135x1550 ft. cinder blocks, concrete, brick, freight terminal, Okie St., to A. C. Constr. Co., 136 Jastram St. Est. **$50,000.** McCarthy Freight System, Inc., lessee. CD 7/30—ENR 8/6.

Tex., Fort Arthur—PLANT—Babcock & Wilcox, Port Arthur, steel fabricating plant, machine shop, corrugated iron shed, etc. Force account. **$90,000.**

Tex., Houston — PLANT — Black-Broillier, Inc., 803 Blodgett St., Houston, expanding, remodeling pipe manufacturing plant. Force Account. **$60,000.** CD 5/25—ENR 5/28.

Wis., Milwaukee—FACTORY—Karr Mfg. Co., Inc., 1825 S. Kinnickinnic Ave., masonry and concrete contract remodeling 4 story, 43,100 ft. factory and 11x20 ft. boiler room, to A. Schmitt & Son, 2771 N. Cramer St.; carpentry contract to E. Schemenauer, 3862 N. 24 St.

Notice to Readers

Please do not write for additional information on individual jobs. It is not possible to answer such letters.

All the information that it is permissible to release is reported in these pages.

Business News Department

ENGINEERING NEWS-RECORD

Wis., Milwaukee—PAINT SHOP—Stolper Steel Products Co., 3258 W. Fond du Lac Ave., 1 story, 58x100 ft. brick paint shop, concrete fdn., to A. C. Wolff Inc., 1729 N. Water St., F. F. Orolshagen, 647 W Virginia St., archt.

Wis., Milwaukee—FACTORY—Perfex Corp., 500 W. Oklahoma Ave., 1 story, 52x124 ft. concrete block factory addn., concrete fdn., to Permanent Constr. Co., P. O. Box 2057. CD 5/26—ENR 5/28.

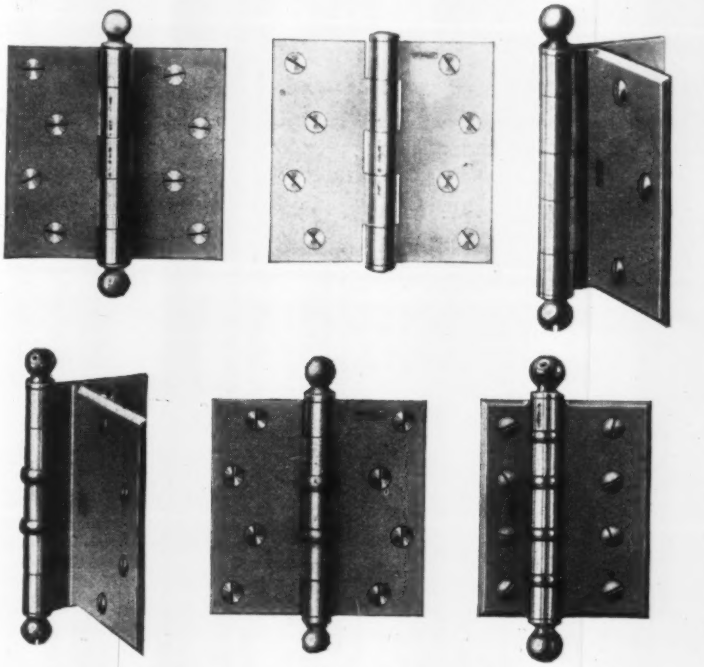
Wis., West Allis (Br. Milwaukee)—RECTIFIER, etc.—Allis-Chalmers Mfg. Co., 1126 S. 70 St., 1 and 2 story, 32x176 ft. steel, brick, rectifier and assembly Bldg., concrete fdn., to Gebhard-Berghammer, Inc., 5420 W. State St., Milwaukee. C. E. Meyer, c/o owner, archt.

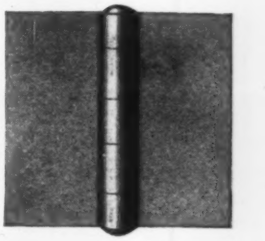
Ont., Chatham — FACTORY — Ontario Steel Products, 81 St. George St., 1 story, 75x105 ft. tile factory addn., own forces. **$42,000.**

Ont., St. Catharines—FACTORY—Thompson Products Ltd., 37 Louth St., 1 story, 60x120 ft. brick factory addn., own forces under supervision F. Allcock, supt. **$40,000.**

Ont., Windsor—PLANT—Bryant Pattern & Mfg. Co., 469 Shepherd St., 1 story, 70x100 ft. brick, concrete factory addn. Owner builds. Est. **$40,000.** CD 7/30—ENR 8/6.

★**Que., St. Hilaire**—REFINERY—Richelieu Beet Sugar Co., Ltd., 112 St. James St., Montreal, refinery, to F. X. Lambert, 6 Cote d'Abraham St., Quebec City. Est. **$500,000.** CD 4/7—ENR 4/23.





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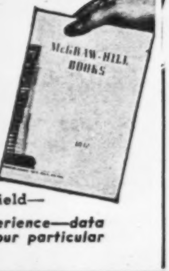

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E.N.R.

NEW ADVERTISEMENTS received by August 21st appear in August 27th issue subject to limitations of space available

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P-930, Engineering News-Record
520 No. Michigan Ave., Chicago, Ill.

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P-954, Engineering News-Record
330 W. 42nd St., New York City

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These Positions Vacant advertisements are published subject to agreement by the advertisers not to consider applicants now employed on war work unless they obtain written release from present employer.

STRUCTURAL DETAILERS, accurate and fast workers for Mill buildings and Bridges. Steady work with plenty overtime. State experience and rate. Summer Engineering Co., 239-4th Ave., Pittsburgh, Pa.

FIELD ENGINEERS, Instrument Men and Draftsmen, Pittsburgh district; steady work and overtime, if desired. Defense work. State experience and salary expected. P-909, Engineering News-Record, 330 W. 42nd St., New York, N. Y.

WANTED — $3,000,000 Naval Air Base in Florida requires services of a hustler who has had experience on government contracts as project manager or general superintendent. Man with technical background preferred. P-911, Engineering News-Record, 330 W. 42nd St., New York, N. Y.

NEEDED FOR DEFENSE Contract: Engineer experienced in specifications and design of water treatment plant. Duration: One year. Defense contract salaries. Also, electrical, mechanical, and civil engineer designers. P-912, Engineering News-Record, 520 N. Michigan Ave., Chicago, Ill.

INSTRUCTOR in Civil Engineering, to teach primarily Surveying, also Engineering Problems, Mechanics; opportunity to supplement income by teaching War Training courses and by summer teaching; Location, Tennessee. Should be available Sept. 15, 1942. P-925, Engineering News-Record, 520 N. Michigan Ave., Chicago, Ill.

ARCHITECTURAL, MECHANICAL, STRUCTURAL draftsmen — Write for interview. Work expected to last for duration. Defense project near Newport News, Virginia. P-928, Engineering News-Record, 330 W. 42nd St., New York, N. Y.

PRODUCTION MANAGER to supervise fabricating and warehousing operations for Reinforcing Bar warehouse in New York or Baltimore. State in first letter age and draft status; education and experience in detail; income expected and when can report. P-947, Engineering News-Record, 330 W. 42nd St., New York, N. Y.